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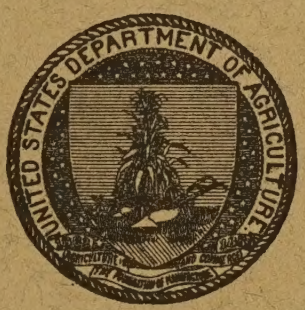
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF SOILS
IN COOPERATION WITH THE MISSISSIPPI GEOLOGICAL SURVEY

SOIL SURVEY OF GEORGE COUNTY MISSISSIPPI

BY

W. E. THARP, OF THE U. S. DEPARTMENT OF AGRICULTURE, IN CHARGE, AND E. P. LOWE, OF THE MISSISSIPPI GEOLOGICAL SURVEY

[Advance Sheets—Field Operations of the Bureau of Soils, 1922]



WASHINGTON
GOVERNMENT PRINTING OFFICE
1925

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[PUBLIC RESOLUTION—No. 9.]

JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]

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MAP

Soil map, George County sheet, Miss.

SOIL SURVEY OF GEORGE COUNTY, MISSISSIPPI

By W. E. THARP, of the U. S. Department of Agriculture, in Charge, and E. P. LOWE, of the Mississippi Geological Survey

DESCRIPTION OF THE AREA

George County is located in the southeast corner of Mississippi. The southern boundary is about 25 miles from the Gulf coast, and Lucedale, the county seat, is 40 miles from Mobile. The land area is 475 square miles, or 304,000 acres.

The county lies entirely within the longleaf pine region of the State. With the exception of the lands under cultivation and a few square miles of virgin pine in the southwestern townships, the uplands and second bottoms are cut-over lands. (Pl. I.) These great tracts were formerly covered with longleaf pine, but practically all the merchantable timber has been removed. Much of it was destroyed by storms in 1906 and 1916, and prostrate logs encumber the ground in many places. Throughout most of the uplands the remaining slash and the blackened stumps are more or less concealed by scrubby oaks which have sprung up since the removal of the pine. In places the lands are more open, and scattering stands of seedling pines are growing up. Almost everywhere there is an undergrowth of sedge and wire grasses.

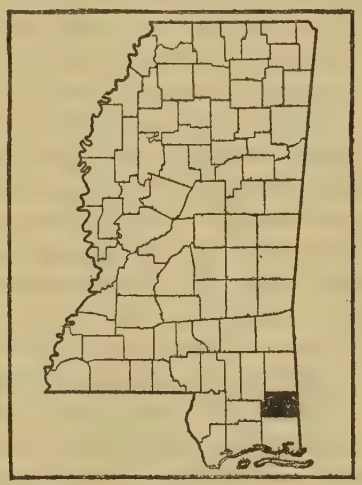

FIG. 2.—Sketch map showing location of the George County area, Mississippi

The courses of the small streams are marked by a dense growth of bay, maple bushes, and vines, above which rise the slender trunks of the tall slash pines. The first bottoms of the larger streams are densely forested. Oak, hickory, and sweetgum are the dominant large trees, with much magnolia, ash, poplar, swamp pine, and maple. Cypress and tupelo gum are abundant around the "lakes" and along old channels that intersect all these "swamps," while holly, ironwood, and a great variety of other small trees, bushes, and vines leave little chance for any herbaceous plants requiring much sunlight.

Physiographically this county is the highest of the several rather well-marked terraces or broad benches which form this part of the coastal plain of southern Mississippi. The lower ones near the coast are less dissected than the higher benches farther inland, of which only remnants exist. The comparatively high table-land on which Lucedale is located is a nearly flat interstream divide falling away

on each side to somewhat hilly country, the topography of which is due to its advanced stage of erosion. Similar elevated plains of less extent are found in other parts of the county, as well as many narrow flat-topped ridges, which may be less than one-eighth mile wide.

The topography of the greater part of the county is rolling to moderately hilly, with a few very small areas of hilly to broken land, confined chiefly to the south sides of Whisky and Black Creeks. Most of the region drained by Brushy Creek is rolling to hilly, with rather deep ravines at the heads of the upper tributaries.

The first bottom, or overflow land, of the Pascagoula River is a densely forested belt ranging from 2 to 4 miles in width. This is bordered on each side by wide second bottoms, locally known as "pine flats," which vary from 1 mile to several miles in width and lie 10 to 50 feet higher than the first bottoms. In the northern part of the county there are a number of high benches between Pascagoula River and Big Creek, and much of the region from this creek southward is a succession of high benches slightly tilted toward the south.

Within this county the Escatawpa River flood plain is from one-fourth to one-half mile in width. There is a series of terraces on each side; the first or lowest terraces are well-defined flats of unequal elevation, and the higher terraces are not very clearly distinguished from the uplands, which in the southeastern part of the county have rather mild relief.

Numerous springs throughout the rolling lands and along the lower margins of the terraces insure the almost unfailing flow of the small branches, while the larger branches and the creeks are perennial. In the creeks the water is slightly coffee colored,[1] particularly at low stages or where the larger "bays" contribute to the flow. At flood stage the Pascagoula River carries much yellowish sediment, and this is true in lesser measure of the Escatawpa River. Black and Red Creeks are comparatively free from mud at all stages, although somewhat discolored.

Water of excellent quality is usually obtainable throughout the uplands at depths of 25 to 50 feet. In a few sections deeper wells are necessary. On the second bottoms, tubular wells driven to the stream level afford a safe and abundant supply of water for domestic use. There are strong artesian wells at Merrill and near Wilkerson Ferry.

George County was formed in 1910. The population in 1920, according to the United States census, was 5,564. The area between Rocky Creek Church and Agricola is the most thickly settled, but farm homes and small villages are found in all parts of the county. The negro population is small and largely confined to farms. There are very few foreign-born residents.

The Gulf, Mobile & Northern Railroad, which crosses the county from northwest to southeast, is the chief transportation line for this county and contiguous areas in Greene County. The Mississippi Export Railroad crosses the eastern part of the county from north to south, but regular train service is not maintained at

[1] This coloration of the water, which is common to most streams in the coastal country, appears to be due to the presence of organic matter and absence of lime.

present (1922). A large part of the distribution of goods to and from Mobile, and locally, is made by auto trucks. The Pascagoula River, which in this county is 400 to 500 feet wide, is a navigable stream, but little use is made of it except for floating timbers to Moss Point (Jackson County). The roads through the "swamp" are often flooded and the ferries rendered useless during winter overflows. In the eastern part of the county many farmers make Mobile their marketing point. Most shipments of truck crops from Lucedale go directly north by railroad.

Rural mail routes or star routes cover the county. Nearly all farms east of Pascagoula River and many of those on the west side have telephone service. Most of the rural schools are now consolidated into 12 districts, and transportation of pupils is provided at public expense.

A good system of main roads reaches practically all sections of the county. They are not hard surfaced, but much labor is devoted to their maintenance. In all the areas of Greenville and Orangeburg soils the construction of serviceable dirt roads at moderate cost is feasible, and these highways are in good condition most of the year. This is largely true of roads in Ruston soils, although in the rolling parts clay spots and various other inequalities in character of the material are encountered. In the Caddo and much of the Norfolk soil artificial drainage is necessary. Seepy spots, as well as short stretches of Susquehanna clay, are very often encountered in these soils. The Susquehanna soils give the road builder his most difficult problem, owing to the soft and adhesive character of the underlying clay. Most of the roads crossing the second bottoms follow the Kalmia soils as much as practicable, and avoid the Myatt, Okenee, and Leaf soils.

CLIMATE

The winter climate of this area is practically the same as that which attracts visitors to the coast resorts 40 miles south of Lucedale. Outdoor occupations may be carried on the entire year, and much farm work is done during January and February.

Spring comes early. Many wild flowers appear in February. Pear, plum, and peach trees bloom before March 1, and a little later the native grasses are usually well started. The growing season is long for even tender vegetation. The average date[2] of the first killing frost in the fall is November 8; and of the last killing frost in spring, March 9. The earliest frost recorded occurred on October 22, and the latest occurred on April 12. The higher uplands very often escape frosts, which are severe in the river bottoms.

The average annual rainfall is in excess of 60 inches. Its distribution is such that injury to a crop by dry weather is seldom serious if the ground has been properly prepared. More frequently there is an excess of rain, and this is a contingency which should be provided for in all agricultural operations. Sleet and snow are very rare.

[2] These dates are from records of an observer for the U. S. Weather Bureau at Leakesville, 15 miles north of Lucedale, at an elevation of 105 feet.

The following table of climatic data is compiled from the records of the Weather Bureau stations at Merrill, in George County, and at Leakesville, in Greene County:

Normal monthly, seasonal, and annual precipitation at Merrill and temperature and precipitation at Leakesville

Month	Merrill (elevation 76 feet)			Leakesville, Greene County (elevation 105 feet)					
	Precipitation			Temperature			Precipitation		
	Mean	Total amount for the driest year (1910)	Total amount for the wettest year (1912)	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1917)	Total amount for the wettest year (1900)
	Inches	*Inches*	*Inches*	*° F.*	*° F.*	*° F.*	*Inches*	*Inches*	*Inches*
December	5.85	4.46	9.84	50.5	83	11	5.77	1.51	8.76
January	4.93	3.56	7.95	51.1	87	9	4.53	4.07	5.31
February	5.60	5.95	4.72	51.3	86	−5	6.01	5.46	12.12
Winter	16.38	13.97	22.51	51.0	87	−5	16.31	11.04	26.19
March	6.45	1.00	11.17	60.8	91	21	5.83	5.76	5.50
April	6.56	1.02	20.16	66.2	95	29	4.78	3.98	8.09
May	6.18	3.36	6.32	74.0	100	39	4.75	2.40	3.84
Spring	19.19	5.38	37.65	67.0	100	21	15.36	12.14	17.43
June	6.46	11.62	4.48	79.8	104	50	5.94	.80	15.58
July	9.13	9.12	7.14	81.2	109	58	8.05	7.34	6.83
August	5.81	2.84	6.86	81.6	103	58	5.54	5.80	4.89
Summer	21.40	23.58	18.48	80.9	109	50	19.53	13.94	27.30
September	5.88	2.48	3.51	78.0	102	37	4.91	3.95	5.92
October	2.92	3.28	1.83	67.4	100	27	2.74	.42	3.60
November	3.50	2.64	1.86	58.1	89	20	3.11	1.42	1.84
Fall	12.30	8.40	7.20	67.8	102	20	10.76	5.79	11.36
Year	69.27	51.33	85.84	66.7	109	−5	61.96	42.91	82.28

AGRICULTURE

More than a hundred years ago a considerable number of white people had established permanent homes within the present limits of George County. On lower Pascagoula River and near Black Creek there were several small plantations. At Fairley Ferry and other places on the river, fields consisting chiefly of sandy and silty clay areas of the Ochlockonee soils produced excellent crops of corn and some cotton. All these lands have long since been abandoned on account of increasing frequency of overflows. Elsewhere the scattered farms were little more than patches on which subsistence crops were grown. Cattle raising was profitable under the conditions then prevailing, and it is said there were many sheep ranging the woods. The abundance of oak mast in the bottom lands, and generally of pine seeds on the uplands, made hog raising very profitable. Mobile was the chief market for cattle and surplus dressed meats and wool. These products and the timber which was rafted down the Pascagoula River were almost the only sources of cash income then available.

The period of primitive farming may be said to have closed about 40 years ago. About this time modern methods of lumbering were introduced. The rapid expansion of the lumber industry is indicated by the many abandonded sawmill sites. While mercantile and transportation activities were for the time being greatly increased, agriculture received little permanent stimulation. Agricultural development has taken place very largely since the lumber business declined to its present comparatively insignificant proportions. Of the total area of 304,000 acres in the county, about 17 per cent was included in farms according to 1910 census returns, but only about 5,800 acres were under tillage. In 1920 the acreage in tilled crops had increased to 14,000. The assessor's returns for 1917 give the area in actual tillage as 13,400 acres, which had increased to about 15,000 in 1922.

Cotton has never been of prime importance as a crop. The long haul to shipping points has been a serious obstacle. The climatic conditions are more favorable to the boll-weevil injury than in regions of less rainfall and lower humidity. The short-staple varieties are quite regularly grown by many farmers, but practically none make this their principal crop. In 1909 about 600 acres produced 273 bales, and in 1919 about 3,000 acres yielded 846 bales, according to the census returns.

Corn is an important crop on every farm. The acreage in 1919 slightly exceeded 7,000 acres and the yield was 122,000 bushels. The crop is very largely consumed on the farm as feed for work animals and for fattening hogs.

On a few of the larger farms 40 acres or more of oats are quite regularly sown for winter grazing or for hay, but on most farms only a few acres or none at all are devoted to this crop. The 1920 census shows a total of 230 acres of oats in 1919.

An occasional patch of rye or wheat is seen but these crops are very little used as supplementary winter feeds. If sown in September or early October on properly prepared ground, very satisfactory returns are usually obtained, although rust and smut sometimes prevent maturity of the grain.

Sugar-cane sirup is an important product and at least a small patch of cane is regularly planted on almost every farm. The last census returns show a total of 253 acres producing about 45,000 gallons of sirup in 1919, but the acreage and yield in 1922 greatly exceeded these figures. The climate, soils, cheapness of fuel, and distribution of labor favor the culture of cane by almost every farmer. The production of sirup bids fair to become an important industry.

Sweet potatoes are grown everywhere as a food crop and the quantity grown for sale is limited only by available markets. The canning plant at Luce Farms can use about 40,000 bushels which are mostly grown under contract with farmers in the vicinity of Lucedale. For this use the Dooly variety is preferred, and yields of 150 bushels per acre of selected potatoes are obtained by good cultivation and judicious fertilization. Snap or string beans are also canned at this plant. This crop, which matures about the middle of May, is grown in small acreages under contract and occupied 180 acres in 1921.

During the last few years potatoes have become an important crop near Lucedale. The Bliss Triumph is a favorite variety, of which yields of 100 bushels or more per acre are commonly obtained. Planting is done as early in February as conditions permit and the first shipments are made about May 15.

A very great variety of garden products, flowers, and many kinds of fruits are grown for home use. Collards, cabbage, turnips, green onions, and lettuce may be very satisfactorily grown in open winter gardens while more tender products usually may be planted early in April. Watermelons and cantaloupes ripen in July, strawberries in March and April.

Peaches, figs, cultivated plums, and pears are common yard trees. Pears are being planted on a commercial scale by several landowners. There are few bearing apple trees, apparently old seedlings, with an occasional tree of the Horse variety, which is known to do quite well under southern conditions. The necessity of combating insect and parasitic pests discourages more extensive planting of peach, pear, and other fruit trees.

Within the last 15 years many pecan trees have been planted on farms, usually as yard trees or in small groves. Many of these have grown well and yielded quite regularly although in many cases the nuts are small. In recent years more extensive plantings of such varieties as Schley, Stuart, and Success have been made, particularly near Lucedale.

The Satsuma type of orange[3] thrives and many small plantings have come into bearing in recent years. This has encouraged the planting of several large orchards, as well as hundreds of trees around farmsteads.

Cattle raising has long been an important source of income, particularly in sections remote from the railroads. Excepting a few milk cows, mostly Jersey, all the animals are native cattle of rather poor quality but adapted to present range conditions. Little feeding is practiced except to turn the animals into the inclosed fields where velvet beans have been grown. Enough pork for home use is produced on every farm. Comparatively few live hogs have been marketed thus far. Sheep are raised in the western part of the county. A few carloads have been shipped in recent years to outside markets. The annual wool clip averages from 2 to 3 pounds per animal. No winter feeding is necessary. Some loss is suffered as a result of depredations by dogs and predatory wild animals.

More than 75 per cent of the total area of George County is uncleared land. This forms a vast free grazing ground, as the law permits all kinds of livestock to run at large during all seasons of the year. This great area embraces practically all the so-called "swamps," "bays," "slashes," and other more or less poorly drained lands, all the uplands too rolling for easy tillage, and a very considerable part of types valuable for agriculture but not yet brought into cultivation.

The native vegetation ranges from the dense forest growth on alluvial soils to the thin grassy cover and scattered oaks of upland sand hills. The arboreal vegetation is wonderfully rich in variety

[3] See "Culture of Citrus Fruits in the Gulf States," Farmers' Bulletin No. 1343, U. S. Department of Agriculture.

if all the bushes and vines of the lowland woods are included. These contribute in no small measure to the winter and early spring grazing, but the chief dependence and most accurate measure of value for grazing is the herbaceous vegetation. There is a great variety of small annual and biennial flowering plants and a widespread growth of several very common grasses.

Broom sedge is the most generally distributed of these grasses. It thrives on all kinds of soil if not shaded or compelled to compete with more desirable grasses, which, in most cases, require richer soils than the sedge demands. This coarse grass has spread over most of the cut-over pine lands. The sedge and several kinds of wire grasses form most of the grassy growth on all the lighter soils. On the heavier types there is more carpet grass (*Axonopus compressus*), Bermuda grass, and lespedeza. Carpet grass is not only well established in many inclosed pastures formerly in cultivation, but thrives on moist lands that have never been cleared. Under rather close grazing and much trampling it will displace sedge and wire grass.

The length of the grazing season on the open range for cattle and horses varies. As a rule the sedge and wire grasses are well started in early March, and during all the spring months livestock fares well on the average cut-over areas, which, of course, include much low ground. The summer pasturage is less satisfactory, and early frosts practically drive all cattle into the "swamps" for the remainder of the season. From this time tame pasture or supplemental feed is needed for milk cows and all stock which it is desired to keep in good condition. Some winter feeding is necessary for all animals except sheep and goats.

A comprehensive treatise on the utilization of these grazing lands is contained in Bulletin No. 827, U. S. Department of Agriculture, "Cut-over Pine Lands of the South for Beef-cattle Production." Valuable information may also be gained from the reports on experimental work in cattle feeding at the Mississippi Agricultural Experiment Station, at Poplarville, Miss.

Up to the present time agriculture has been confined almost entirely to the level lands and to the soil types requiring the least expenditure of labor in fitting the land for cultivation. The rolling lands are avoided, particularly the more sandy types, on account of their tendency to erode when brought into tillage and partly because in this newly opened section (formerly forested, now cut-over) it has been the natural thing to take up the smoother lands first. Soils requiring artificial drainage have not yet been needed. Opinions differ as to the comparative value of the red and gray (or lighter colored) upland soils for general farming, but this is often due to previous experience elsewhere on these soils. In general, the Greenville loam and sandy loam are held in high esteem for general farming, while the Greenville loamy sand and lighter Orangeburg and Ruston soils are preferred for truck growing. Although the Kalmia and Norfolk types are considered most desirable for sirup production, nearly all types are used for this purpose. The red types have very generally been selected as sites for orange and pecan groves, but this is due in some measure to the accidental fact that men who have shown most interest in these promising industries are owners of Greenville and Orangeburg soils.

There is considerable diversity in the methods of tillage. Many farmers make a practice of flat-breaking all ground and bedding up the rows for planting afterwards. Others bed out without previously stirring the ground. The former method, with modifications to suit different crops, is becoming more common as 2-horse plows, riding cultivators, disk harrows, and other labor-saving implements come into use. Cotton is planted on the ridges; corn generally in the water furrows. Wide beds with shallow water furrows are favored for some crops.

The practice of growing velvet beans in corn in every third row, or by drilling in the rows, is almost universal. The 90-day varieties are commonly used, and by planting a little late the beans do not seriously interfere with the corn. Their great value as winter forage and as fertilizer is becoming generally recognized. Velvet beans have almost entirely superseded cowpeas in this country.

Improved machinery is coming into use. On a number of farms tractors are regularly used for breaking ground. Both disk and moldboard plows are used and disk harrows are favorite implements. Mowers and hayrakes are a part of the equipment on almost every well-managed farm, but less attention is given haymaking than conditions seem to warrant.

No regular crop rotations are practiced, except that the same truck crop is rarely planted in succession on the same land. Freshly cleared land is preferred for sweet potatoes; the second crop is usually corn. Potatoes are followed the same season by corn, velvet beans, or in some instances sweet potatoes.

The 1920 census shows an expenditure of $62,455 for commercial fertilizer, or about $116 per farm reporting. Since retail prices for fertilizer in that year were high, the quantity used was small. In 1922 about 1,000 tons were used.[4]

Conttonseed meal and acid phosphate in various combinations form the chief fertilizer now used. Cotton, corn, and in many instances sugar cane, receive from 100 pounds to 200 pounds per acre of mixed fertilizer. A fertilizer of the formula 8–2–4[5] is commonly used on potatoes at the rate of from 1,000 to 3,000 pounds per acre. Cottonseed meal alone is often used on sugar cane, and a few growers favor an application of 50 pounds per acre of nitrate of soda to hasten growth. The experience of farmers on practically all types of soil indicates that profitable results follow the use of acid phosphate on corn and cotton. Most farmers apply the manure produced on the farm, and excellent results are obtained from its use on all types of soil. Lime[6] has been used experimentally in a very few instances.

In general this is a county of small farms, most of which are operated by the owners and their families. Comparatively little hired labor is used, except on a few large farms. In some localities there are considerable numbers of colored landowners, but the supply of colored labor is not great.

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[4] Estimates by county agent.

[5] Percentages, respectively, of phosphoric acid, nitrogen, and potash.

[6] Lime can be obtained from the State crushing plants free of charge. The Gulf, Mobile & Northern Railroad will transport agricultural lime at practically no expense to the user.

The census of 1920 reports 601 farms in the county, of an average size of 108 acres. About 23 acres is the average area under cultivation. Less than 8 per cent of the farms are rented. Rates of rent have hardly become stabilized, but from one-fourth to one-third of the principal crops usually goes to the landowner.

Land ranges widely in price. Some unimproved land, well located with respect to the roads and towns and consisting chiefly of Greenville, Orangeburg, or Ruston types, is held at $25 to $35 an acre; land not so desirably situated may range in price from $10 upwards. Hilly land on which there is little timber or which may consist largely of light sandy types may be valued at $5 to $15 an acre for small tracts and less where large tracts are involved. Favorably situated improved land commands from $40 to $100 an acre.

George County is a typical cut-over pineland county, with the principal upland virgin forest growth of longleaf pine practically all removed. The cost of removing stumps varies according to the method employed. Cultivation to such crops as cotton, corn, sugar cane, velvet beans, potatoes, and vegetables is commonly carried on before the stumps are removed. The average stump has a top diameter of 12 to 18 inches. It probably is considerably cheaper to burn than to dig out or blast out the stumps.

The more rolling parts of the various soils of George County are in general better adapted to forestry or to forestry and grazing combined than to farm-crop production, because of their unfavorable topography and their susceptibility to erosion under cultivation. Pine grows rapidly on all of these soils and within a period of 15 to 20 years, if protected from fires, will begin to take on commercial value for pulp wood and later on for poles, posts, and boards, as well as turpentine.

Some other soils in this county also are best suited to forestry or to forestry and grazing because of low productivity, difficulty of tillage owing to the stiffness of the soil, droughty nature, or excessive run-off. Most of the Susquehanna soils are best adapted to the growing of pine trees; and probably the deep sands, such as the Norfolk, Kalmia, and Ruston sands, could be most economically used for pine. The wet bench lands, such as the Myatt, Leaf, and Okenee soils, under existing conditions, probably also could be most economically used for pine timber, and whatever grazing might be obtained after the trees have grown to sufficient size to make them safe from destruction by livestock.

Fire prevention is the main problem in connection with reforestation. There are generally enough seed trees to establish a stand, but this stand will not survive fires and the rooting of hogs, unless protected during the early period of growth.

In many of the wet bottoms providing drainage and protection from overflow of a character adequate to make the cultivation of crops possible would entail large expense; therefore it is believed that a very large proportion of these lands should be allowed to grow up in hardwood trees.

SOILS

George County lies entirely within the Coastal Plains region and in a locality where the material from which the soil has been made

consisted, and the material immediately beneath the soil still consists, of alternating beds of sand, sandy clay, and clay, all of them free from carbonate of lime in any appreciable quantity.[7]

The coarser sands consist almost entirely of quartz, with few visible grains of other minerals, and it is highly probable that the finer sands and the silt grains are of similar mineralogical composition. The clay beds may be richer in phosphorus and potash since such materials usually contain a higher percentage of these constituents than more sandy materials.

There has been but a slight accumulation of organic matter in these soils, except in some of a swampy nature. A forest cover is not conducive to rapid accumulation of humus.

Since the average annual rainfall is about 60 inches, drainage is a most important factor in soil development. Drainage as used here embraces all ways by which these 5 feet of water escape from the land. Surface run-off, percolation, evaporation, and transpiration by plants are all concerned in the disposal of this moisture and indirectly in the development of the features of the soil types. The prevailing moisture conditions of any type are so intimately associated with color that the latter may be regarded as an index of character and amount of water supply to which the given soil has been subjected during its period of development. The soils almost constantly saturated are commonly light gray or "water-soaked gray," while those with a normal or "optimum" content are usually reddish.

Brick-red to reddish-brown subsoils are associated with well-drained, well-oxidized types. The intensity of the red color varies approximately and directly with the proportion of fine-grained particles, such as silt and clay, in the soil. When a considerable proportion of the soil is made up of these it rarely gives up enough moisture to become very dry and the presence of a highly oxidized condition shows that the soil lies and has lain in a position where it remains saturated with moisture but a very short time. The predominance of a deep or rich yellow, resembling the color of cotton-seed meal, indicates good moisture conditions; in situations somewhat subjected to water-logging for considerable periods of time the color inclines to pale yellow with some brownish stains. Mottlings of various shades of gray, red, yellow, and yellowish brown are due to obstructed underdrainage and imperfect oxidation. Such coloration may be developed in the lower part of a 4-foot or 5-foot soil section of a good type having rather close structure, but should not prevail to any degree in the upper subsoil of any well-drained soil.

On gentle slopes and nearly level uplands there is a similarity in the vertical soil sections, except in very deep, loose sands and in the heavy clay beds giving rise to the Susquehanna soils. In most instances the surface layer to a depth of 6 to 12 inches has a rather loose or at least friable structure and a relatively light texture, consisting of sand, loamy sand, or light sandy loam. The subsoil is heavier, contains a larger proportion of fine particles, and is slightly more compact. Lighter textured material appears at depths less

[7] To the geologist this series of beds constitutes the Citronelle formation. See the reports of U. S. Geological Survey and reports of the Mississippi State Geological Survey.

than 40 inches, this being the top of the unweathered or slightly weathered parent material. In virgin areas there may be an inch or two of dark humus-filled material but the subsurface color and structure are only slightly affected by it.

In the types having poor drainage these structural and textural features are not so well defined.

For the purpose of classification the soils are grouped into soil series according to their major characteristics, such as character of parent material, color, structure, and details of the soil section. Each series consists of soil types that differ from each other in texture or relative coarseness or fineness of the surface layers. In this survey 16 series are represented by 29 soil types.

The Greenville types are characterized by the dark-red or brownish-red color of the soil and the deep-red color and friable nature of the subsoil. They are well drained, and usually have a flat topography. The Orangeburg soils are similar to the Greenville, but are grayer or lighter brown in the surface soil and usually not so deep red in the subsoil.

The types of the Norfolk series have gray soils over yellow or greenish-yellow, friable subsoils. This series is not extensively developed in this area. The Caddo series is closely related to the Norfolk series and the types in a sense may be considered poorly drained Norfolk soils. They are distinguished by pale-yellow subsoils with some gray mottling and in places a slight compaction in the lower part of the 3-foot section.

Between these soils of the red-subsoil and yellow-subsoil groups is the Ruston series, which is very extensively developed in this region. The types are generally light brownish in the surface soils, yellow or slightly reddish yellow in the subsurface, and reddish yellow to yellowish red in the subsoil. The structure is friable throughout and the drainage is good.

The Susquehanna soils have gray to brownish surface soils, underlain by plastic, heavy subsoils, characteristically mottled red, grayish, and yellowish. The clay material is derived from Coastal Plain beds of heavy clay. The surface varies from level to rolling and hilly. The surface drainage is good except over the level areas, but the impervious nature of the subsoil retards underdrainage and internal movement of air and moisture.

The Hoffman series is characterized by the gray color of the surface soils and the pink or mottled pink, gray, and reddish color and compact but brittle structure of the subsoil. The subsoil is partly cemented in places, probably with iron salts. The topography is characterized by low, rounded hills and smooth, winding ridges.

The Plummer soils are characterized by the light-gray to ashy-gray color of the material, which, with the exception of faint mottlings of yellowish and dingy brown shows little color change throughout the 3-foot section. The drainage of these soils is extremely poor, whether on flats or slopes, except in dry seasons, when they dry out and harden.

The Lakewood soils are characterized by the white color of the surface layer and the orange or golden-yellow color of the subsoil. They occupy rolling to nearly level areas, and the drainage is well established except in some of the lower situations.

On the wide terraces or "pine flats" of the larger stream valleys, the Cahaba series is one of the prominent soil groups. This includes brown to reddish-brown soils with yellowish-red to dull-red friable subsoils, usually a little stiffer in the lower subsoil than on the somewhat similar soils of the uplands, the Ruston. The Kalmia soils are lighter brown than the Cahaba; the subsurface layer is typically pale yellow, and the lower part of the 3-foot section is yellow and friable, except in the more poorly drained situations, where the lower subsoil is pale yellow with some gray mottling.

The soils of the Leaf series are light gray to gray, and the subsoil consists of compact gray or mottled gray and yellow silty clay which grades below into mottled red and gray or red and yellow plastic clay through which moisture and air move very slowly.

The Myatt series consists of gray second-bottom soils over a mottled light-gray or light bluish gray and pale-yellow subsoil, which at depths of about 24 to 30 inches is locally compact and relatively impervious. The Okenee soils differ from the Myatt chiefly in having black surface soils, the subsoils being much the same. The Cahaba are the best drained of these terrace soils (second and third bottom or stream bench types); the Myatt, Leaf, and Okenee have the poorest subsoil drainage, and the Kalmia soils occupy a place of intermediate drainage.

The first-bottom soils have variations in texture, structure, and local drainage conditions which give rise to the Bibb and Ochlockonee series, light and dark colored types, respectively. The Ochlockonee series has brownish soils with light-brown to yellow upper subsoils and mottled yellowish and grayish lower subsoils. The Bibb series has gray soils with light-gray or light bluish gray subsoils, mottled with pale yellow, locally compact and relatively impervious at depths of about 20 to 30 inches.

In subsequent chapters the soil types are described in detail and their relation to agriculture is brought out. The accompanying map shows their distribution, and the following table gives their actual and relative extent:

Areas of different soils

Soil	Acres	Per cent	Soil	Acres	Per cent
Ruston sandy loam	14,848	16.1	Myatt very fine sandy loam	5,888	1.9
Rolling phase	33,920		Norfolk fine sandy loam	4,928	1.6
Orangeburg sandy loam	22,400	11.8	Swamp	3,840	1.3
Rolling phase	10,304		Plummer fine sand	3,392	1.1
Deep phase	3,136		Cahaba fine sandy loam	1,664	1.0
Ruston loamy sand	13,568	10.3	Slope phase	1,536	
Rolling phase	17,664		Ruston fine sandy loam	3,072	1.0
Ochlockonee clay	28,928	9.5	Caddo fine sandy loam	3,072	1.0
Ruston sand	4,160	7.0	Leaf silt loam	2,624	.9
Rolling phase	16,960		Bibb very fine sandy loam	2,560	.8
Kalmia fine sandy loam	16,768	5.5	Cahaba loamy sand	2,368	.8
Norfolk sandy loam	4,544	4.2	Norfolk sand	2,240	.7
Rolling phase	8,256		Ochlockonee fine sandy loam	1,280	.4
Susquehanna clay	10,688	3.5	Greenville loamy sand	1,024	.3
Ochlockonee silty clay loam	10,176	3.3	Plummer silt loam, depression phase	448	.2
Muck	10,048	3.3	Greenville loam	256	.1
Greenville sandy loam	9,664	3.2	Lakewood sand	192	.1
Kalmia sandy loam	8,896	3.1	Hoffman gravelly sandy loam	128	.1
Light-textured phase	704				
Okenee silt loam	4,032	3.0	Total	304,000	
Swamp phase	5,120				
Susquehanna fine sandy loam	8,704	2.9			

CUT-OVER LAND IN GEORGE COUNTY, MISS.

This tract lies west of Cedar Creek, about 9 miles south of Lucedale. The soil is Kalmia sandy loam in the foreground and Norfolk sandy loam, rolling phase, in the background

FIG. 1.—CUT-OVER LAND ON THE ORANGEBURG SANDY LOAM

FIG. 2.—CULTIVATING POTATOES ON THE ORANGEBURG SANDY LOAM

GREENVILLE LOAMY SAND

The Greenville loamy sand has a dark-brown surface soil ranging in texture from a rather coarse and very friable loamy sand to light sandy loam, underlain at about 6 to 10 inches by deep-red, friable loamy sand, which extends to depths of more than 3 feet. The dark color and loamy character of the virgin soil is due in part to the included organic matter, but the soil also contains considerable fine mineral material.

This type is more commonly associated with the Ruston loamy sand or the Orangeburg sandy loam than with the other Greenville soils. The areas 5 or 6 miles east of Lucedale occupy shallow depressions, but owing to the sandy subsoil structure the drainage is good. No very definite boundaries can be drawn between these areas and the Ruston loamy sand. Where both are in cultivation the Greenville loamy sand has much the darker surface color, and its appearance suggests easy tillage and a yielding power comparable with that of the heavier Greenville soils.

Small areas are found in the deep phase of the Orangeburg sandy loam, but only a few of these are indicated on the map, owing to the small size of the patches. Most of this type is of rather irregular occurrence and few large fields consist entirely of this soil. Probably less than 25 per cent is now in cultivation.

This is a warm, early type adapted to truck crops and may prove better adapted to cotton than heavier types under present conditions. With proper tillage it endures drought well and field crops give satisfactory returns, but it requires rather heavy fertilization, except in the lowest spots or depressions.

GREENVILLE SANDY LOAM

The surface soil of the Greenville sandy loam is a dark-brown to slightly reddish brown friable sandy loam containing enough angular sand to impart a gritty feel. This gives way at a depth of 6 or 8 inches to a brownish-red friable sandy loam, which with increase in depth changes to deep-red crumbly sandy clay, a little more compact when dry and more sticky when wet than the subsurface layer. The pronounced deep-red subsoil color is characteristic of the type and extends to a depth of several yards. In virgin areas the surface layer of a few inches is very dark and contains much organic matter, but the surface of cultivated fields has a distinctly red or brownish-red cast. The soil is only moderately acid.

The type contains a few minor variations. One mile east of Lucedale the soil is brown sandy loam, below 8 inches deep-red friable sandy clay, more sandy at the 3-foot depth; a freshly plowed field appears reddish brown. South of Lucedale the soil is brown to dark-brown sandy loam, below 8 or 10 inches reddish-brown sandy clay loam passing into granular red or deep-red sandy clay. In some areas the upper subsoil is lighter red than the lower subsoil. Southwest of Lucedale the soil is dark reddish brown sandy loam, below 5 to 8 inches reddish-brown heavy sandy loam or sandy clay loam, below 12 to 15 inches deep-red crumbly sandy clay.

Owing to the coarse texture of the subsoil and the presence of a sandy substratum at 10 to 15 feet below the surface, the drainage

is excellent but never excessive. The proportions of sand, silt, and clay give a physical structure highly favorable to maintenance of excellent moisture conditions. Capillarity is good and aeration deep and effective, so that oxidation of the material has extended to a depth of 10 or 12 feet.

The Greenville sandy loam occurs on the wide tablelike tops of the principal interstream divides. The surface is level or nearly level. Where the type is associated with Orangeburg soils, the latter are usually confined to the higher ground, and the Greenville soil prevails on the flat to slightly depressed areas.

Lucedale is located on the northern margin of one of the larger developments of Greenville sandy loam, which extends in a more or less continuous area to Agricola. The associated upland types are mostly Orangeburg soils with some light sandy types on the hillsides above the trenches of Cedar Creek. A considerable area of Greenville sandy loam lies about 3 miles northeast of Lucedale, extending beyond Goose Lake and Rocky Creek Church. Areas occur along the Lampton Road, some of these being so intimately associated with heavy variations of the Orangeburg sandy loam that it is difficult to separate the types. Small areas of the Greenville sandy loam are found west of the Pascagoula River, but only a few are large enough to map.

Eighty per cent or more of this type is included in well-tilled farms, a large proportion being in 40 and 80 acre tracts with good improvements.

Corn without fertilization will generally yield from 20 to 25 bushels per acre. Applications of manure or of a commercial fertilizer, in which phosphoric acid is the chief constituent, increase the yield to 40 or 50 bushels, according to statements of farmers. Winter oats do well, and with a minimum use of a nitrogen and phosphate fertilizer give very satisfactory returns. Some good yields without fertilization are reported. Cotton is grown, but does not mature as early, and therefore the type is not as desirable for cotton production under boll-weevil conditions as some lighter colored and naturally less fertile types. Sugar cane is also grown and high yields are reported in many instances, but the tendency to produce a dark-colored sirup is well recognized.

Potatoes are very extensively grown on this type near Lucedale. With the rather liberal fertilization commonly applied to this crop, yields of 100 to 150 bushels per acre of marketable potatoes are obtained. Sweet potatoes do well, particularly on the higher phases. The adaptation of the type to vegetables, fruits, ornamental shrubbery, and flowers is indicated by the fine gardens and yards in Lucedale. Peach, pear, Satsuma orange, and pecan trees have been grown under a rather wide variety of cultural methods, but with uniformly satisfactory results. Bermuda grass and lespedeza are well established in the yards and along the streets. The 90-day velvet bean thrives exceedingly well, and cowpeas grow vigorously and seldom fail to mature.

This type requires heavier equipment than is needed on the light, sandy soils. Two-horse plows, cultivators, and harrows are necessary for best results. Tractors are used on a number of farms for breaking the ground, disking, and harrowing. With proper management

a good condition of tilth may be maintained, although the soil has a decided tendency to clod if alternations of wet and dry weather prevail. Shallow plowing and neglect to harrow or cultivate within reasonable time after rain often result in bad physical conditions, as baking or crusting.

Velvet beans are commonly grown as a soil-improvement crop with corn or following an early truck crop. The chief fertilizer mixture for farm crops is acid phosphate and cottonseed meal. The rate of application varies on cotton, corn, and oats, but seldom exceeds 200 pounds per acre. The small loss from leaching or surface washing and the very favorable physical condition of the soil insures good results with any fertilizer. In general, the type favors economical management, since labor-saving implements can be satisfactorily used and there is sure response to use of fertilizers.

The present price of this type ranges from about $50 to $100 an acre for improved land, and from $20 to $40 an acre for land unimproved, depending largely upon location. The former heavy stand of large longleaf pine has left many stumps. An occasional pond or small included spot of Plummer silt loam is usually the only waste land in areas of this soil.

GREENVILLE LOAM

The Greenville loam is closely associated with the Greenville sandy loam, occurring in slight depressions and occasionally in local flats very little lower than the surrounding sandy loam. The soil is a dark-brown mellow loam, underlain at 8 to 12 inches by reddish-brown or brownish-red crumbly sandy clay. The lower subsoil is usually a light-red sandy clay which may be more sandy and consequently more friable than the subsurface. Three-fourths mile northeast of Lucedale the soil is a brown mellow loam, underlain at about 10 inches by reddish-brown or brownish-red sandy clay loam, which at about 14 inches passes into deep-red friable sandy clay, extending to 40 inches or more without noticeable change.

Few areas include more than 20 acres, and many embrace less. The boundaries between them and the surrounding sandy loam are very indefinite, and fields in which the loam occurs have more or less of the heavy variation of the sandy loam. In some instances these small areas include a pond in which the soil resembles the Plummer silt loam, that is, a grayish silt loam overlying mottled gray and bluish-gray clay.

The dark color of the surface soil is indication of a good supply of organic matter. The reaction of the soil is moderately acid, as shown by the Wherry colorometric test of a sample of the surface soil.

This loam and adjoining areas of the sandy loam are the heaviest soils now in cultivation. Many farmers do not look favorably upon fields containing this type on account of the greater labor required in keeping it in a satisfactory state of tilth, as compared with lighter soils. This causes some inconvenience where only small spots occur and the farm equipment is entirely adapted to the prevailing light land.

The Greenville loam is a strong soil, well adapted to practically all field crops grown in this region, and nearly all of it is in cultiva-

tion. Corn yields from 25 to 30 bushels without fertilization, and velvet beans, cowpeas, oats, and other forage crops make vigorous growth. One farmer reported a yield of corn on this soil of 25 bushels an acre in 1920, with an application of 200 pounds of fertilizer. Two rows, he reported, yielded at the rate of 56 and 66 bushels of corn per acre, respectively, with an application of 500 pounds of cottonseed meal and a later top-dressing of sodium nitrate.

On included spots of Plummer silt loam or on low spots in this type, ponded water may stand for some time after rain, but on the typical loam it usually disappears in a few hours. The small patches just south of the courthouse at Lucedale are occasionally flooded by heavy rains, but give excellent returns of corn, potatoes, cotton, and most kinds of truck.

ORANGEBURG SANDY LOAM

The Orangeburg sandy loam is a grayish-brown loamy sand, grading at a depth of a few inches into yellowish or reddish-yellow sandy loam, which at about 8 or 10 inches passes into friable reddish-yellow sandy clay loam or heavy sandy loam, and this grades at about 10 to 14 inches into yellowish-red friable sandy clay and into red friable sandy clay at about 18 to 24 inches. In places the red sandy clay lies nearer the surface, especially on the sloping areas. The middle and lower subsoil is a little more compact but scarcely less friable than the subsurface. In places, the extreme lower part of the 3-foot section is more sandy than the material just above it. In all instances the structure favors deep aeration, induces good capillarity, and insures excellent underdrainage.

The virgin soil in places contains enough organic matter to give it a distinctly dark color, but plowed fields usually have a lighter brown or even a reddish-brown cast. The more sandy variations assume, after some years of cultivation, a rather light color and loose surface structure, but they are not droughty. The type includes occasional small flat spots where deep plowing brings up a yellowish-red sandy clay. The colorimetric test of a sample of this soil showed slight acidity.

There are a considerable number of included areas of Orangeburg fine sandy loam, but owing to their small size and the very close resemblance of the fine sandy loam to the sandy loam, physically and agriculturally, the two types are here combined. A level field of the fine sandy loam near Lucedale consists of grayish-brown, rather heavy fine sandy loam underlain at 8 to 10 inches by yellow sandy clay loam, which passes into reddish-yellow friable sandy clay, and this at about 20 inches into red friable sandy clay.

The Orangeburg sandy loam is developed on the wider interstream divides. It has a level to slightly undulating surface and all of it is tillable. (Pl. II, fig. 1.) The individual areas seldom exceed a few hundred acres. Most of them are associated with the Greenville sandy loam and as a rule lie slightly higher and have more local relief than the Greenville.

Probably 75 per cent of the typical soil is now in cultivation. It is highly valued for general farming and is also used for a wide variety of truck crops and tree fruits.

Near Lucedale the Orangeburg sandy loam is used extensively for potatoes and sweet potatoes and for other truck crops, and many pecan and Satsuma orange plantings are being made. (Pl. II, fig. 2.) Cotton, corn, oats, sugar cane, velvet beans, and cowpeas are farm crops regularly grown on the type. While yields vary considerably with seasonal conditions, methods of tillage, and the quantity of fertilizer used, they are usually satisfactory and are less affected by irregularities of rainfall than on types that do not have such favorable physical structure.

Many farmers prefer the Orangeburg sandy loam to the Greenville sandy loam on account of somewhat greater ease of cultivation of the Orangeburg. In general, a somewhat lower price is obtained for farm lands consisting chiefly of Orangeburg than of similarly located Greenville soils.

A level field of included Orangeburg fine sandy loam near Lucedale is said to have produced over 10 tons of lespedeza hay in one cutting on 7 acres in 1920. This was seeded in 1919 and was cut once that year, then reseeded itself to produce the 1920 crop. The lespedeza field was seeded about the first of January to Texas Rustproof oats after double-disking to a depth of 6 to 8 inches. About a month later the plants on the lespedeza ground were so much greener and better than on adjoining corn ground, that a sharp line of separation was visible at a considerable distance.

Near this lespedeza field, 23 acres of Orangeburg sandy loam produced 470 bushels of corn, as stated by the operator, every third row being planted to velvet beans. After the corn was harvested and the beans were picked, 35 head of cattle were put in on November 1 to graze the cornstalks and velvet beans. They received no other feed and were taken off December 31 in fine, fat condition.

Orangeburg sandy loam, rolling phase.—The rolling phase of the Orangeburg sandy loam consists of essentially the same soil resting on the highly oxidized red sandy clay subsoil characterizing typical Orangeburg sandy loam, but the surface soil is more variable in depth and texture, ranging from a loamy sand 10 or 15 inches deep to a sandy loam so shallow that the stiff red clay may be turned up by the plow. The shallower soil is generally confined to the steeper slopes and ends of the secondary divides which drop off rather abruptly to the bottom lands. Areas in such locations often contain some concretionary material and include spots of Ruston sandy loam. In places this rolling phase forms an irregular border along smoother tracts of Orangeburg and Greenville soils. As a rule it includes only the upper part of hillsides, merging on the lower slopes into Ruston or Norfolk soils. The area southeast of Lucedale sloping toward the railroad is fairly representative, but the small tract on the northwest side of the town is more sandy than the average of this phase.

Practically none of this phase has as yet been brought into cultivation. Perhaps three-fourths of it could be utilized for cultivated crops if terracing and contour cultivation were practiced. The steep slopes at the heads of ravines and some of the included spots of stiff clay are practically untillable and should remain forested. Under present economic conditions, with large areas of unused smooth and relatively smooth land available, it appears that most of

this land could better be used for wood lots or forestry, or for forestry and grazing jointly. Of course some areas could be farmed to advantage where they join fields of the smooth lands, provided the slopes are carefully terraced.

On all this phase Bermuda grass, lespedeza, and carpet grass do well after the original vegetation has been eradicated by a few years of cultivation. This suggests means of profitably utilizing much of this rolling land on which continuous cultivations will prove less satisfactory than on smoother lands.

Orangeburg sandy loam, deep phase.—The deep phase of the Orangeburg sandy loam consists of grayish-brown to light-brown loamy sand, grading in the virgin areas at 3 or 4 inches into light-brown or yellowish-brown loamy sand, and this at about 8 inches into slightly reddish brown sandy loam, which at about 12 inches passes into light-red sandy loam, underlain at 20 to 28 inches by red friable sandy clay loam extending to depths of 36 inches or more. In places the lower subsoil is a sandy clay rather than sandy clay loam.

The phase as mapped includes patches of Ruston loamy sand and on occasional flats or slight depressions some spots of Greenville loamy sand. The areas near Vaughn Switch are undulating to slightly hilly and vary from Orangeburg sandy loam to Ruston loamy sand, the latter generally being on the lowest slopes. The areas along the east boundary south of Howell Church include flat spots of Greenville loamy sand and some patches of typical Orangeburg sandy loam.

Between Mountain and Basin this phase occupies the margin of the upland along the Pascagoula Valley. It has a level to slightly undulating surface and varies somewhat toward the Ruston loamy sand. Most of this land is in cultivation and produces good crops of corn, cotton, potatoes, and sugar cane. It responds well to fertilizers and endures dry periods remarkably well. These tracts include excellent locations for peach orchards, and are well adapted to pears, figs, and most of the garden products and yard trees necessary for a comfortable farm home. This is also true of the areas south of Howell Church.

Nearly all of this phase in the vicinity of Basin and about one-half of that near Howell Church is in cultivation. Very little of the remainder has as yet been cleared. The present land values are about the same as for the typical sandy loam.

RUSTON SAND

The Ruston sand is a grayish-brown to brownish-gray sand grading at a depth of 3 or 4 inches into yellow or yellowish-brown loose sand which gradually assumes a more reddish cast with increase in depth, usually becoming reddish yellow at 15 to 20 inches. At depths of 30 to 40 inches the material usually is reddish-yellow to yellowish-red somewhat loamy sand, but in some places it is loose and contains very little fine material. As a rule the subsoil sand is more coherent than that of the Norfolk sand.

The substratum generally is a loose light reddish brown to yellowish-brown sand. Its depth is variable, as indicated in road cuts,

where somewhat compact sandy clay or heavy clay is frequently seen at 3 to 10 feet below the surface. The red color does not everywhere come so near the surface.

The soil material consists chiefly of quartz sand with a slight accumulation of organic matter in the immediate surface layer. The proportion of clay and other fine constituents is less than in the Ruston loamy sand. Small, smooth chert and quartz gravel is present in places, but is not abundant.

This type occurs on the high ridges north of Lucedale, in the rolling areas drained by Rocky and Brushy Creeks, and on the uplands east of Escatawpa River. It is generally associated with other Ruston soils, particularly the loamy sand. In many places it grades imperceptibly into the adjacent soils, and a sharp boundary can not be drawn between them.

Practically all this type is cut-over land and the remaining timber is of very inferior quality. The present characteristic growth consists mainly of small, scrubby oaks, with a few pine seedlings. The undergrowth, chiefly sedge, is thin and bunchy and has little value for pasturage.

On the smoother areas of this type there are occasional flat spots where the soil is darker than elsewhere and the subsoil slightly heavier. These are tillable, but most of the areas are of rather low agricultural value, and require liberal fertilization or manurial treatment for good yields. Potatoes, peaches, and vegetables should do very well when properly fertilized.

Ruston sand, rolling phase.—With respect to soil characteristics the rolling phase of the Ruston sand is very similar to the typical soil, but the topography ranges from rather smoothly rounded ridges to moderately steep slopes along streams, mainly at the heads of drainage ways.

The rolling phase is considerably more extensive than the typical soil. Practically none of it is suitable for tillage. It has a higher pasturage value than the smoother land, owing to the presence of seepy spots, ravines, and small bays included in the areas. It is a good soil for the growth of pine trees.

RUSTON LOAMY SAND

The surface soil of the Ruston loamy sand is a brown loamy sand in which the loamy quality is due to organic matter and fine-textured mineral material. The influence of the organic matter does not usually extend below 4 or 5 inches, the subsurface being a yellowish-brown slightly coherent sand, which at 10 to 15 inches grades into reddish-yellow loamy sand or very light sandy loam. At a depth of 25 or 30 inches the reddish color and loamy character usually become quite pronounced and the material in places is a friable sandy loam. About 2 miles northeast of Agricola the soil is a grayish-brown to light-brown loamy sand 3 or 4 inches deep, overlying yellowish-brown loamy sand, which grades into reddish-yellow loamy sand to very light sandy loam.

This type is richer in organic matter than the Ruston sand, and the little surface patches of clean, white quartz grains are less numerous,

except on some of the coarser textured variations. It also has a greater proportion of clay particles and iron oxide in the lower part of the 3-foot soil section, and a greater capacity for retaining moisture.

The Ruston loamy sand occurs chiefly in the eastern and northern parts of the county, but small areas are found in the western sections. The smoother areas occupy the high divides, forming tracts of ten to several hundred acres of undulating to gently rolling lands. In flat spots and local depressions the soil usually grades into Ruston sandy loam, or in many places into Greenville loamy sand. In the large areas a few miles east of Lucedale there are many small included patches of Greenville and Orangeburg loamy sands.

Some of the coarser textured variations have a yellowish-brown subsoil and seem to be somewhat less retentive of moisture than the typical soil. One such area occupies a depression of the uplands a mile or more northwest of Basin School. Those areas adjoining the Ruston and Orangeburg soils generally have a heavier subsoil than the areas associated with other types. This desirable variation is usually apparent in the darker color and closer texture of the surface soil.

The longleaf pine attained a large size on this type, but the stand seems to have been less thick than on heavier soils. Scrubby oaks are now abundant, with some large oak and hickory trees on the heaviest variations. Sedge and wire grass form most of the herbaceous growth, with carpet grass on the lower slopes and along drainage ways.

This is a warm, early soil, easily tilled, and more resistant to drought than might be inferred from its physical characteristics. Farmers state that crops do not usually show effects of dry weather if proper tillage is given. Cotton, corn, potatoes and sweet potatoes, velvet beans, and most small truck crops are grown very satisfactorily. The soil requires rather liberal fertilization and the maintenance of the supply of organic matter by turning under crop residues and barnyard manure. Probably less than 1 per cent of the type is now in cultivation.

Ruston loamy sand, rolling phase.—The rolling phase of the Ruston loamy sand ranges in topography from strongly rolling to somewhat hilly. The steepest slopes are at the heads of local drainage lines, and in places extend one-fourth mile or more toward the main stream. In some places rather steep hillsides consisting chiefly of this phase overlook the small creeks. In all such locations the areas include patches of other types, recognizable by differences in contour or in the vegetation, or the occurrence of seepy spots.

The present predominant growth is scrubby oak, with a more varied vegetation along the branches, which provides better pasturage than that on the smoother land.

Very little of this phase can be considered tillable. Small fields of irregular outline and varied soil conditions could be cultivated, but the phase as a whole is more suitable for grazing or the growing of pine for lumber.

RUSTON SANDY LOAM

The soil of the Ruston sandy loam is a grayish-brown to light-brown loamy sand, grading at 4 or 5 inches into yellowish-brown loamy sand, and this at about 10 to 15 inches into yellow or faintly reddish yellow sandy loam, which in turn passes into reddish-yellow or yellowish-red, friable sandy clay or sandy clay loam. In places the lower subsoil is mottled with lighter colors than the predominant yellowish red, such as reddish yellow and yellow. Locally the lower subsoil is plastic and usually compact, and the abundant mottling indicates imperfect aeration. In places the lower part of the 3-foot section is a sandy loam.

Small areas of this type occur on the divides in nearly all parts of the county. As a rule the surface is undulating, with occasional nearly level tracts of 10 to 40 acres. The latter, if a heavy subsoil prevails, may include some Norfolk sandy loam, while if the subsoil is coarse textured, the Ruston soil may be underlain by the brick-red Orangeburg subsoil material.

With the exception of occasional "gum ponds" too small to indicate on the map, and small, rather flat, included spots of Norfolk or Caddo sandy loam, all this type has good drainage. It may not dry quite so soon after heavy rains as the Orangeburg sandy loam, but the subsoil never remains saturated for a long period.

The Ruston sandy loam has an extensive distribution throughout the southern parts of Mississippi, Alabama, and Georgia. The smoother areas favor economical tillage and are adapted to a wide range of field and truck crops. The type in this county is fairly representative. The soil of the more rolling land and that bordering areas of the sand and loamy sand is less retentive of moisture than that having the sandy clay subsoil at 10 or 15 inches, but none of it is droughty.

A fine stand of longleaf pine originally covered all parts of this type, but very little merchantable timber remains. The seedlings find this a congenial soil, and would recover much of it if their destruction by fires were prevented. Possibly about one-fourth of the smooth land of this type east of the Pascagoula River has been brought into cultivation. Very little of the type west of the river has been cleared. The present value of the smooth land situated on good roads ranges from $15 to $30 an acre, with lower prices for land not so well located.

This type is generally deficient in organic matter and consequently low in nitrogen. Cowpeas and velvet beans do well and afford the most economical means of supplying nitrogen. Phosphoric acid gives profitable increase of yields and is necessary for most crops. Potash fertilizers have not been used extensively, except on land devoted to truck crops.

Ruston sandy loam, rolling phase.—The Ruston sandy loam, rolling phase, includes all the rolling to hilly lands on which the Ruston sandy loam is the prevailing soil. As mapped, this phase necessarily represents a rather broad grade of land in which topographic variations and minor differences in character of the soil can not be satisfactorily indicated. The characteristics of the

Ruston soils prevail, although the textures range from sand to heavy sandy loam.

In the vicinity of the smoother areas of Orangeburg and Greenville soils the upper slopes mapped as Ruston sandy loam, rolling phase, consist in part of Orangeburg soil, but farther down the slopes the greater depth of sandy surface soil and prevailing lighter color of the subsoil justify the mapping of the soil as Ruston, although there are unimportant patches of Orangeburg soils. Near areas of Susquehanna soils the phase includes sandy surface soil with plastic sandy clay subsoil. Patches of Susquehanna, Norfolk, and Caddo soils have also been included, usually along the lower border of the Ruston areas. The occasional small areas of Susquehanna clay or Susquehanna fine sandy loam generally occupy local elevations. On the comparatively steep slopes facing the Pascagoula Valley and some of the larger creeks, the phase is a mixture of sandy soils ranging from typical Ruston sandy loam to Caddo fine sandy loam. These were not mapped in detail, in view of the unfavorable topography. Such areas are adapted to the growing of pine, which seems to do very well on all these soils.

The rolling phase includes many small patches—usually less than 5 or 10 acres—sufficiently flat to be easily tillable. These occupy tops of the wider ridges and a few narrow strips of bench land along creeks. Larger areas can be used for crops when the demand for agricultural land justifies considerable outlay for terracing. Broadly considered, most of this phase, under present conditions, is more suitable for pasturing and forestry. It is an excellent grade of land for the rapid growing of pine, a crop which is gradually becoming more valuable. The present price ranges from $3 to $10 an acre.

The following table gives the results of mechanical analyses of samples of four different sections of the typical Ruston sandy loam:

Mechanical analyses of Ruston sandy loam

Number	Description	Fine gravel	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
		Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
424845	Sandy loam, 0 to 2 inches	1.2	10.4	10.7	29.7	20.0	22.6	5.5
424846	Sandy loam, 2 to 6 inches	.5	8.4	10.1	30.1	21.2	22.0	7.7
424847	Sandy clay loam, 6 to 18 inches	.2	5.4	8.2	27.8	17.6	24.0	16.7
424848	Sandy clay loam, 18 to 36 inches	.4	6.7	8.0	26.6	18.7	22.4	17.4

RUSTON FINE SANDY LOAM

The Ruston fine sandy loam is a light-brown fine sandy loam changing at a depth of 4 or 5 inches into yellowish-brown heavier fine sandy loam, which passes into yellow fine sandy loam and at about 10 inches into yellow friable fine sandy clay loam, which grades at 15 to 20 inches into reddish-yellow friable fine sandy clay loam or fine sandy clay, and this into yellowish-red fine sandy clay loam to fine sandy clay. The fine sandy clay loam or fine sandy clay subsoil generally extends to a depth of 3 feet or more, but in

places fine sandy loam comes in at about 32 to 36 inches. Light reddish yellow is the dominant color of the upper subsoil and reddish yellow of the lower subsoil, but in some places there is considerable yellow mottling. The heavier and less easily permeable variation of the subsoil is a somewhat plastic, compact, yellowish-red clay.

The virgin soil generally contains more organic matter than that of the Ruston sandy loam. It is also a little heavier, and deep plowing usually brings more yellowish-colored soil to the surface. This is most noticeable in sags and rather flat spots where the dark-colored, fine textured topsoil may be underlain by a yellowish subsurface layer.

This type occupies the flat tops of the wider divides and generally does not extend onto the adjacent slopes. Areas lie a few miles southeast of Lucedale, others near Central School and to the southeast and a few small areas west of Pascagoula River. Many small patches have been mapped with the Ruston sandy loam.

Approximately one-half of this type is embraced in small farms, but not all of this is cultivated. It is considered a little more susceptible to wet weather than the sandy loam. Corn yields about 20 to 25 bushels per acre. Cotton does as well as on other types. All the minor crops do well.

This type responds well to fertilization. While some included low spots require drainage, the level surface and otherwise uniform character of the soil are favorable to satisfactory and economical tillage.

NORFOLK SAND

The Norfolk sand consists chiefly of light-brown to yellowish-brown medium quartz sand, containing little silt or clay, underlain in virgin areas at about 1 to 4 inches by yellowish-brown sand, passing into yellow loose sand, which usually extends to a depth of several yards without essential change in character. In many places the surface layer is bleached almost white. There is considerable included Norfolk coarse sand, having essentially the same color and structural characteristics through the vertical section. In some places the lower subsoil is slightly reddish yellow or yellowish red and more coherent, and resembles that of the Ruston soils.

This sand differs from the Ruston sand in its lower content of fine soil particles and iron oxide. With local exceptions, it is a deep, droughty sand with a special adaptation to such drought-resistant plants as the upland willow oak (*Quercus cinerea*), locally called "blue oak," and blackjack oak (*Quercus marilandica*)[8] along with scattered pine and an occasional dogwood. Palmetto trees are abundant in many places and patches of cactus are numerous. The grass is thin and bunchy, consisting chiefly of sedge.

Areas of several hundred acres are mapped in the southern part of the county, chiefly on the highest divides. Small areas occur at relatively lower elevations in the eastern and southeastern parts of the county.

[8] Identified by Dr. E. N. Lowe, State geologist of Mississippi.

A rolling variation of the Norfolk sand is developed at some points along Rocky Creek, with somewhat larger areas about 5 miles northwest of Lucedale and in the extreme western part of the county. This variation differs from the typical soil in the stronger relief, most of it being rolling to steep near the streams. Occasional small areas consist of narrow ridges separated by short ravines. The soil is very similar to that of the less rolling areas. In ravines a varied flora is found but on most of the variations the vegetation is thin.

The Norfolk sand is used successfully for crop production in many parts of the South, where it occurs close to good markets or transportation lines. It is generally used for special crops like peaches, dewberries, pecans, and vegetables. Heavy fertilization is necessary for good yields. Productivity can be increased by plowing under green crops, particularly legumes, such as velvet beans. Isolated areas, particularly where more productive soils are available, can probably best be used for growing pine trees for lumber.

NORFOLK SANDY LOAM

The Norfolk sandy loam is a grayish sand or grayish-brown loamy sand grading at 3 or 4 inches into yellowish-brown loamy sand and this into yellow loamy sand or very light sandy loam, which at 12 to 15 inches passes into yellow friable sandy clay. In places there are splotches of red and yellowish red below depths of 22 to 26 inches. In spots there is very faint compaction in the lower subsoil, and some soft yellowish-brown concretionary material occurs in or just above this zone of faint compaction. In the more sandy variations and where the local relief is pronounced the subsoil usually has a bright cottonseed-meal color, a friable structure, and good moisture-holding capacity. A chemical test of the surface soil shows only a moderate degree of acidity.

The type is found on the rather flat tops of ridges and their gentle upper slopes. Few areas embrace more than 100 acres, most of them less. Although well adapted to general farming, very little is in cultivation. It is well adapted to most of the crops grown in the region, including the pecan, Satsuma oranges, corn, oats, and potatoes; but rather liberal fertilization is necessary for good yields.

Norfolk sandy loam, rolling phase.—The rolling phase of the Norfolk sandy loam is more extensively developed than the typical soil. The topography is rolling to somewhat hilly with some rather abrupt slopes along drainage lines.

The topographic inequalities give rise to considerable variation in the texture and structure of the 3-foot soil section. On the tops of divides and on the upper slopes, where the latter are not sharply inclined, gray sandy surface soil prevails, which has a yellow, friable, sandy loam subsurface grading with depth into yellow or cottonseed-meal-yellow sandy clay. The moisture conditions are good and cultivated crops would do well provided surface washing were prevented. On the lower slopes, particularly in the vicinity of Susquehanna soils, a sticky, plastic, yellow clay forms the lower subsoil in places, and in some places this approaches the Susquehanna clay in color and physical characteristics. In such places seepy spots occur which on long declines may be well-developed Plummer fine sandy loam. The narrow areas of this phase along

the creeks include many such wet spots due to a clay stratum just below the surface. The areas in the extreme southwestern part of the county include much of the heavy subsoil phase and also many spots of Susquehanna very fine sandy loam. The large areas west of Mauvella have less of this heavy subsoil, except on the lower slopes. Most of these tracts could be cultivated. The areas near Black Creek include some tillable land, but are mostly rolling and embrace much of the heavy subsoil phase.

This rolling phase as a whole is better adapted to pasture and forestry than to tillage. Pine trees grow rapidly and if properly protected from fires will in 15 or 20 years become large enough for pulp wood and soon thereafter for certain cuts of lumber. The numerous drainage ways and seepy spots afford congenial locations for water-loving vegetation and carpet grass is invading these places. Broom sedge and wire grass on the higher land have less competition from scrub oak than on lighter soils. Practically all the longleaf pine has been removed. None of this phase is cultivated. The present price may be placed between $5 and $10 an acre.

NORFOLK FINE SANDY LOAM

The Norfolk fine sandy loam is a grayish-brown fine sandy loam grading at a few inches into pale-yellow friable fine sandy loam, this passing at 10 to 12 inches into a somewhat brighter yellow, friable fine sandy loam, which with increase in depth passes into yellow fine sandy clay or fine sandy clay loam. Where the surface is slightly rolling the bright-yellow subsoil color prevails with some very light grayish or brownish mottling in places. On flat areas there may be some compaction in the lower subsoil and brownish or yellowish stains and gray mottling in patches representing inclusions of Caddo fine sandy loam.

This type is found on flat-topped ridges where fine sandy material overlies a fine sandy clay subsoil. In such situations the Norfolk soil does not usually extend down the slopes, but gives way to Ruston or Orangeburg sandy loam.

The type, with local exceptions which are mostly spots of Caddo very fine sandy loam and fine sandy loam, is well adapted to cotton, potatoes, corn, cowpeas, velvet beans, pecans, and vegetables. It responds well to fertilizer, and with proper cultivation, crops on it will endure much dry weather. It does not come into condition suitable for tillage quite so soon after rains as most of the Ruston soils. Very little of this type has been brought into cultivation. Similar soils along the Atlantic seaboard are extensively utilized for general farming and for truck growing.

CADDO FINE SANDY LOAM

The Caddo fine sandy loam is a gray to dark-gray fine sandy loam grading at a depth of a few inches into pale-yellow friable fine sandy loam, which at about 10 to 12 inches passes into yellow friable fine sandy clay. At 20 to 30 inches slightly more compact material is usually encountered and the imperfect drainage and lack of effective aeration is evident in the prevalence of faint grayish mottlings and partial segregation of the iron content into soft yellowish

and brownish concretions. This type occurs on uplands having slight relief as compared with the usual configuration of the Ruston and Norfolk soils.

The largest area of the type is situated north of Benndale School and is a rather flat tract lying somewhat lower than the Ruston and Norfolk soils to the north and east but well above Mill Creek to the south. This was originally covered with a heavy stand of large longleaf pine. None of it is in cultivation. The present pasturage of sedge and wire grass appears to be superior to that on the surrounding types.

The areas south of Black Creek are essentially a mixture of Norfolk and Caddo fine sandy loams, all having very slight relief with a general inclination to the south. "Slavonia," as this section is called, was the scene of an unsuccessful colonization plan by Slavish people some years ago.

Small areas of Caddo fine and very fine sandy loam, the latter in places a silt loam, lie west of Mauvella. Small parts are cultivated but are difficult to manage in wet seasons.

The Caddo fine sandy loam requires drainage and much care in tillage, as well as liberal fertilization, for satisfactory results with farm crops. Under present conditions reclamation would not prove profitable.

SUSQUEHANNA FINE SANDY LOAM

The Susquehanna fine sandy loam is a light-gray to pale yellowish gray fine sandy loam passing within a few inches into yellow fine sandy clay, which is friable just below its contact with the surface layer, but more plastic and sticky with slight increase in depth. This passes at 10 to 20 inches into stiff, heavy red clay which in the lower part of the 3-foot section is usually much mottled with yellow and gray or bluish gray, the latter becoming the dominant color at depths of 30 to 40 inches, where the comparatively unaltered parent material is reached. When wet the subsoil is plastic and sticky.

There is a good deal of variation in the type according to topographic position and proximity to other types. Where it joins areas of Ruston sandy loam the boundary is often not well defined and the soils are extremely varied. The type as mapped includes much Susquehanna clay and patches of the fine sandy loam having a shallow surface soil.

The topography ranges from smoothly rolling to hilly, with some spots of very rough ground. The area between Bexley and Cross Roads is hilly to strongly rolling, with some rather smooth ridge crests occupied by soil resembling a heavy phase of the Ruston fine sandy loam. The area a few miles northeast of Bexley consists of high, rolling uplands culminating in the sandy hills mapped as Ruston sand and loamy sand. This area includes some tillable lands, but such tracts are usually limited to a few acres of smooth land. They merge on the lower slopes with phases of Norfolk and Kalmia soils and on the highest points usually pass into Ruston sandy loam or sand.

The Susquehanna fine sandy loam produces fairly good crops for a few years after being cleared. It is difficult to prevent severe surface washing, and this has caused many small fields and patches

to be abandoned. Those variations which occur on the crests of ridges and resemble the Ruston or Orangeburg soils are most desirable for tillage. Even including these, it is probable that less than 1 per cent of the total area is now in cultivation. Probably the greater part of this land could be most profitably utilized by reforesting with pine.

SUSQUEHANNA CLAY

The Susquehanna clay consists of red heavy clay which passes into mottled red and yellow and then into mottled red, yellow, and gray or bluish-gray plastic clay. Locally there is little red below depths of 30 to 40 inches, the color being predominantly bluish gray with some yellow or pale-yellow mottling. In places the subsoil begins as a mottled red and yellow or red, yellow, and gray clay. Usually there is a thin surface covering, an inch or two thick, of light brownish gray very fine sandy loam, sometimes underlain by yellowish-brown or yellow friable very fine sandy clay. In many places the fine sandy surface soil is lacking or consists of an inch or two of gray or pale yellowish gray very fine sand. As mapped the type includes spots of fine and very fine sandy loam in which the surface soil is underlain by yellow sticky clay or fine sandy clay, the characteristically red and mottled clay occurring only in the middle or lower part of the 3-foot section.

The outstanding features of the type are the stiffness of the clay when dry and its high plasticity and stickiness when wet. The reddish-colored surface layer assumes a distinctly granular structure on partial drying, if not puddled. The middle or mottled zone, showing colors of red, yellow, and gray, is quite as intractable as the more thoroughly oxidized red clay above and even less permeable to water. The third or lower layer of gray clay, in which there are usually some yellowish streaks along cracks on joint planes, admits of very slow downward movement of water, which is practically prohibited in the deep layers of the clay.

In places there is considerable gravel on the surface, consisting of small well-rounded quartz and chert pebbles, but these are seldom incorporated with the clay. Many of these gravelly spots are on the hills overlooking Big Creek Valley between Mountain and Cross Roads. As a rule, this gravel appreciably changes the character of the soil, and there is but little hard concretionary or "platy" material.

Generally the content of organic matter is highest where the fine sandy surface layer is deepest, and lowest where this covering is thin or entirely lacking. On bald spots, or where the red clay is exposed, very little vegetable matter has become mixed with the mineral constituents. All of the type appears to be acid, and the deeply bedded clay from which the type is derived contains no evidence of lime carbonate.

The largest area of this type lies along the west county line in Range 8, extending from the jog in the county boundary nearly to Whisky Creek. The topography is rolling to strongly rolling, with a small area just south of the jog which inclines to the north and is deeply cut by ravines. This large area includes much Susquehanna fine or very fine sandy loam, also some ridge tops having a rather friable reddish fine sandy clay subsoil resembling the Ruston sub-

soil. This area of Susquehanna soils includes the only tract of virgin longleaf pine remaining in the county. The trees are large and form a rather thick stand in most places. It seems that fewer trees have been overturned by the wind than on most other types. There is but little brushy undergrowth and the forest, with its comparatively smooth grass-covered floor, presents a most pleasing contrast to most of the cut-over lands.

The narrow areas of this type along the streams generally are hilly to somewhat broken, with variable soil conditions due to uneven topography. They include practically no tillable land and are best adapted to forestry. Between ranges 8 and 9 broken tracts of this type form the high hills overlooking Black Creek. Here the lower slopes in places consist of deep ravines separated by narrow hog backs on which the comparatively unweathered clay forms the soil. Here the longleaf pine is largely replaced by shortleaf pine, hickory, and white and post oak. A similar condition prevails just below the jog in the west county boundary.

The pasturage is generally superior to that on very sandy lands since on the typical Susquehanna clay the native grasses have a rather thick bunchy growth. Practically all this type is better adapted to forestry than to other uses. The present valuation is determined almost entirely by timber upon it.

HOFFMAN GRAVELLY SANDY LOAM

The Hoffman gravelly sandy loam is brown to reddish-brown sand or light sandy loam with many pebbly concretions on the surface. This is underlain at 3 or 4 inches by yellow to reddish-yellow sand or sandy loam which passes at depths of 5 to 14 inches into compact sandy clay loam, mottled reddish yellow or red, yellow, and gray, the lower subsoil being a sandy clay splotched with light red, red, purplish red, yellow and yellowish gray. The pebbles range from the size of peas to large marbles, and include some larger fragments which appear to have their origin in the platy ferruginous partings which sometimes occur in the sand and clay beds underlying the Ruston and Susquehanna soils.

Small patches of this type occur on the ridges a mile west of Lucedale. As mapped, some Ruston sandy loam with a few concretionary pebbles is included, but the typical Hoffman soil not only has an abundance of the material but usually lies somewhat higher than the surrounding soils. Some small low mounds, due to the resistance of the hard subsoil to weathering, stand out conspicuously. This type has little agricultural value, but is suitable for woodlots.

PLUMMER FINE SAND

The Plummer fine sand is a poorly drained hillside type occurring in small areas that are usually bounded on the upper side by a distinct rim or drop of 2 or 3 feet. Since the meadowlike surface bears but few trees or bushes and the grass seldom attains a height of more than 10 to 12 inches this seepy marginal rim is a very noticeable feature.

The soil is usually a dingy-gray fine sand underlain by somewhat lighter colored material of similar texture which in the lower part

of the 3-foot section usually has some yellow, yellowish-brown, or rusty-brown stains. In places there is very little change to a depth of 36 to 40 inches. Small brown concretions the size of peas are present locally in small quantities in the soil and subsoil.

The subsoil is usually in a saturated condition, giving rise to the peculiar shade of gray which may be described as water-soaked gray. On a low flat west of Black Creek the material below an inch or two passes into light-gray to almost white fine sand, with some pale-yellow mottling, which flows like quicksand. This quicksand in some localities makes it impossible practically to drain this land by open ditches. In many places the impervious clay substratum which underlies all areas is within reach of a 40-inch soil auger. It is a heavy, tenacious, gray clay, with more or less brownish mottling.

All this material has a very light color when dry, as shown in the crawfish chimneys which are numerous in most areas. When moist it has a cold appearance and lacks the grainy or friable structure of a normal soil of similar texture. The predominantly light color, usually with less mottling than is common to most poorly drained soils, may indicate the removal of much of the ferruginous constituents. Stains resembling bog iron occur in places among the grass roots. The soil has an acid reaction.

The grass on this type affords considerable pasturage in the spring, but is of poor quality later in the season, especially if the soil becomes dry and hard. The tall trumpet-shaped pitcher plants and white "button tops" or "hat pins" are characteristic flowers. The stunted pines and cypress indicate poor adaptation to these trees and few others are found on the typical Plummer soil. A more varied growth of trees and bushes appears on the lower margins where the type merges into the Okenee soils or Swamp. The areas on the upland just south of Black Creek include many thick titi patches where the surface soil contains considerable organic matter and is more like an Okenee type. The Plummer fine sand is known locally as "slash." None of it is cultivated, and its reclamation is hardly feasible.

PLUMMER SILT LOAM, DEPRESSION PHASE

The Plummer silt loam, depression phase, as mapped in this survey, is a variable soil. It comprises in the level areas of uplands several types which were not separated owing to their complexity of occurrence, small extent, and wet condition. The soil occurs where there are numerous small shallow depressions, locally known as "gum ponds" on account of the presence of gum trees and the presence of water during most of the year. A few areas contain 15 or 20 acres, but the majority are only a few acres in extent.

In these depressions the soil normally is a gray to dark-gray silt loam to a depth of 10 or 15 inches, underlain by light-gray plastic silty clay sufficiently heavy to offer considerable resistance to the downward movement of water. Near the margins of the ponds more sandy material commonly lies within 40 inches of the surface. In places the soil consists of brown silt loam with rusty-brown mottling, grading at 5 or 6 inches through a zone of pale yellow into yellow friable silty clay, which passes at about 28 inches into yellowish-red or dull-red and yellow friable clay. The red color apparently is

due to concretionary ferruginous material, which makes the lower subsoil seem friable, although in places it is compact and resembles hardpan. Some of the type consists of dark-gray to brownish-gray fine sandy loam, underlain at 10 inches by light-gray silty clay loam, passing at 12 or 15 inches into pale-yellow silty clay mottled with gray. These various soils included in this type doubtless owe their origin to the slow accumulation of silt and clay particles from the surrounding land.

These soils are rich in organic matter, moderately to slightly acid, and probably have a somewhat higher content of potash and phosphoric acid than the average upland type. One small area, quite effectively drained some years ago, produced excellent crops of corn as long as good drainage was maintained.

Since soils of this character tend, on partial drying, to assume a granular structure, a desirable state of tilth may be maintained, although requiring more careful tillage than a sandy soil. The subsoil also checks or cracks when excess water is permanently removed. Artificial drainage is usually satisfactory, provided the surface water is promptly and completely removed. The small areas involved and the length of outlet necessary renders drainage in many instances somewhat expensive. Since most of these ponds are situated in areas of Greenville and Orangeburg soils underlain by loose sand at from 10 to 25 feet, the practicability of drainage by means of wells suggests itself. Vertical tiles in a bored well might prove effective in some instances, but a dug well several feet in diameter with some provision for preventing filling by fine earth would probably be more satisfactory.

These areas support a growth of sweetgum, May haw, and black gum. If drained they should produce good corn and oats. Lime might prove beneficial.

LAKEWOOD SAND

The Lakewood sand consists of white quartz sand underlain at depths of a few inches to as much as 36 inches by pale-yellow sand scarcely less incoherent than the bleached surface layer.

The type occupies small areas along Red Creek, for the most part on low ridges having a dunelike conformation. It also includes a few spots of similar sand in the hills a few miles northeast of Lucedale.

Much of the surface is bare sand. The vegetation consists mainly of scrubby oaks, in places clumps of oak resembling small live oak considerable palmetto, and some drought-resistant shrubs.

CAHABA LOAMY SAND

The Cahaba loamy sand is a brownish-gray or grayish-brown loamy sand, passing at 2 or 3 inches into yellow or reddish-yellow loamy sand and at 15 to 20 inches into yellowish-red or dull-red loamy sand. In places the surface is a reddish-brown loamy sand which passes into red friable sandy loam. The lower subsoil in places is a reddish-yellow loamy sand to sandy loam.

Areas of this type occur on the east side of Pascagoula River opposite Fairley Ferry on terraces from 10 to 20 feet higher than

the first bottoms. These have considerable textural variation, ranging from decidedly coarse textured brownish-red loamy sand to fine sandy loam with yellow or reddish-yellow, sandy clay subsoil, the latter variation occurring farthest from the river. There are also small spots of shallow fine sandy loam with a stiff, red, fine sandy clay subsoil; these are usually associated with the Kalmia fine sandy loam.

All the type in this locality is tillable and about two-thirds of the total area is in cultivation. Good crops of corn, velvet beans, cotton, sugar cane, and minor crops are regularly produced. It is held in high esteem by farmers, as it responds well to fertilization and endures periods of low rainfall with less effect upon crops than might be inferred from its coarse texture.

Patches of Cahaba loamy sand or sandy loam occur on the outer margin of all the high terraces on Pascagoula River. Most of them include only a few acres and some are at a distance from public roads, but they form desirable sites for farm buildings.

On the west side of Escatawpa River there are several areas of Cahaba loamy sand which are somewhat lighter in color and texture than those previously described. The small areas below Latonia are loamy fine sand and lie somewhat higher than the adjoining Kalmia soils. In the larger areas below Howell Bridge, the soil to a depth of 5 to 8 inches is a grayish-brown to brown loamy sand or sand, underlain by brownish-yellow loamy sand which grades into yellow loamy sand at about 24 inches. On flats and in the slight depressions the yellow subsoil suggests poor drainage, but the surface soil is brown and has good physical properties. In some of the deeper depressions the soil contains more organic matter and is usually a dark sandy loam over yellowish-brown sandy loam.

These areas occur on a terrace 30 or 40 feet above the first bottoms. About half of them are under cultivation. Although the soil is light, it endures drought remarkably well, and produces good yields of corn, cotton, velvet beans, and some truck crops. Pecan, peach, and pear trees do well. On one of the small areas on Cedar Creek, similar to those just described, about 2 acres of Concord grapes were set out about 17 years ago. These have quite regularly produced fruit of good quality, which has been sold locally, the average gross returns being about $75 an acre.

CAHABA FINE SANDY LOAM

The virgin soil of the Cahaba fine sandy loam is a light-brown to dark-brown fine sandy loam containing considerable organic matter in the first 3 to 7 inches. The subsurface is a yellowish-brown to reddish-brown fine sandy loam which at 8 to 14 inches changes to a reddish-yellow to dull-red, heavy fine sandy loam or fine sandy clay, more compact than the subsurface layers. The lower part of the 3-foot section, below about 30 inches, is prevailingly reddish-yellow or yellowish-red fine sandy clay loam to fine sandy loam.

In all areas underdrainage and aeration are good, and the physical structure is very favorable to proper moisture conditions, ex-

cept in places adjoining Kalmia types or light sandy ridges mapped as Cahaba loamy sand. In such locations drainage conditions are variable.

Small areas of this type lie near the north county boundary on McInness Creek. They are level fields 10 or 15 feet above the Kalmia soils to the south. All are in cultivation and valuable for general farm crops. The area a mile northwest of Wilkerson Ferry is a high terrace on which the soil ranges from fine sandy loam to moderately coarse loamy sand, but has the reddish subsoil coloration indicative of good drainage. Much of this area was in cultivation many years ago, but is now a favorite grazing place for cattle, and scattered old-field pines give most of it a beautiful parklike appearance. The areas between Broom School and Black Creek include marginal variations of the Kalmia fine sandy loam, the Cahaba soil being best developed along the crest of this high terrace.

The original stand of longleaf pine included some hickory and oak, with little undergrowth. About half of the type is in cultivation. Cotton, corn, sugarcane, oats, and all minor crops do well, although fertilization is necessary. As on other Cahaba types, long-continued cropping has reduced the content of organic matter so that manure or other organic materials are greatly needed.

The present price of most of this type is difficult to estimate owing to small size of areas, inclusions of other types, and in many instances distance from public roads. It is about equal in agricultural value to other red soils, but for the above reasons does not command as high a price.

Cahaba fine sandy loam, slope phase.—Between Wilkerson Ferry and Black Creek the margins of the high terraces rise from 20 to 50 feet above the lower lands to the east and south. In places the slopes are short and abrupt, but generally they are of moderate gradient and include inclines not too steep for cultivation. The slope phase of the Cahaba fine sandy loam includes these slopes and also those along the sides of pronounced drainage lines extending into these high bench lands.

The soil on these slopes is a fine sandy loam underlain by red or reddish-yellow silty clay loam. In places it is a sandy loam with some spots of sandy clay loam. On the lower slopes seepy spots occur in many places, but the higher ground has better drainage.

The greater part of this phase is untillable on account of topography. The areas of moderate value for cultivation would require careful management to prevent erosion. In this respect, as well as in general crop adaptation, the soil is similar to the Ruston sandy loam.

KALMIA SANDY LOAM

The virgin soil of the Kalmia sandy loam is a dark-gray to yellowish-brown loamy sand underlain at 3 or 4 inches by pale-yellow to brownish-yellow loamy sand to sandy loam, which passes at about 10 to 15 inches into yellow, heavy sandy loam to friable sandy clay. The lower subsoil is usually more compact and generally shows yellowish and some grayish mottling, but does not contain much concretionary material. In cultivated fields the surface assumes a grayish cast, and where deeply plowed, yellow friable clods are usually in evidence. An area 1 mile west of Wilkerson Ferry on

Pascagoula River consists of gray loamy sand grading at 3 or 5 inches into pale-yellow or grayish-yellow sand and into pale-yellow sandy loam at 8 to 10 inches, this being underlain by pale-yellow heavy sandy loam to sandy clay, with reddish-yellow splotches at about 30 inches.

Considerable textural variation occurs in most areas, the higher land being more often a deep loamy sand while that slightly lower may have the yellowish sandy clay subsoil within 10 to 15 inches of the surface. This makes some difference in moisture conditions, but none of the type is droughty. The rather high average level of the water table causes local depressions to be wet much of the time and in some of these the soil is Okenee sandy loam. The areas east of Mountain are of this character.

The largest areas of Kalmia sandy loam lie west of the Escatawpa River in Township No. 3. They are high, uneven terraces with a general decline toward the river. Much of the surface has fairly good natural drainage. The soil is very friable and easily tilled, but inclines to pack after heavy rains, due in part to the silty character of some of the flat areas and to the general deficiency in organic matter.

Probably less than 5 per cent of the type is now in cultivation. Much of it could be utilized with such improvement in drainage and care in cultivation as is suggested for the Kalmia fine sandy loam.

The type as mapped includes small areas of a low-lying variation, which consists of more recently formed second bottoms, and in places is subject to overflow for brief periods. The areas of this sort along Brushy Creek are low benches often extending to the channel and there forming a high bank. The uneven surface includes many low sandy ridges and, near the foot of the hills, swales and flats containing patches of Myatt and Okenee types. Larger areas occur along the Escatawpa River as low, uneven, sandy or fine sandy loams lying above the usual overflow. Small areas lie along Big Creek and other tributaries of the Pascagoula River. Longleaf pine is the principal forest tree, and in most places the grassy undergrowth affords considerable pasturage.

Kalmia sandy loam, light-textured phase.—The light-textured phase of the Kalmia sandy loam consists of brownish-gray sandy loam about 3 inches deep over yellow loamy sand extending 3 feet or more below the surface. It occupies low mounds and in places long ridges from 5 to 15 feet higher than the adjacent lands. Scrub oak and longleaf pine are the characteristic trees, with much palmetto on the highest parts where the surface soil may be white sand. This description applies to most of the areas near Escatawpa River. Those on Red Creek consist of somewhat coarser and whiter sand. Rather fine textured and loamy phases are associated with the Kalmia soils along Black Creek. The soil has a low agricultural value, and probably can be used best for timber production.

KALMIA FINE SANDY LOAM

The Kalmia fine sandy loam is a dark-gray fine sandy loam, underlain at 5 or 6 inches by pale-yellow to brownish-yellow fine sand or loamy fine sand, passing at 8 to 10 inches into yellow fine sandy clay, which extends to depths of 3 feet or more without much change. At 30 or 40 inches the subsoil is somewhat compact and shows some

mottling of gray and yellowish brown, which is probably an indication of frequency of saturation at this depth. The average level of the water table is high and during the winter and spring often stands just below the surface.

The Kalmia fine sandy loam is extensively developed on the higher and wider terraces of the largest streams. Locally it is called pine flats, as the original stand of longleaf pine was thick and of good quality. The surface is level to very slightly undulating, with occasional deep drainage lines on the highest terraces. As mapped the type includes the margins or slopes to the first bottoms. On these the soil may be more like the Cahaba fine sandy loam or the slope phase of that type. The larger areas necessarily include many low spots where soil conditions are identical with those on the Myatt and Okenee soils.

The areas on the east side of the Pascagoula River lie from 20 to 40 feet above the adjacent bottoms. Much of this land has a level surface and decidedly poor drainage. The areas in the vicinity of Wilkerson Ferry occur on high terraces from 50 to 100 feet above the Pascagoula bottoms, but this elevation does not materially improve the drainage, owing to lack of local relief and the fine texture of the material. This is also true of much of the type south of Black Creek. The areas on upper Black Creek are from about 10 to 30 feet above the first bottoms. On the Escatawpa River the type occupies rather low benches but all is above overflow. The soil here is variable, ranging from light sandy loam to silty loam, the latter variation in places having a very heavy subsoil. Some patches of Leaf silt loam are also included.

Probably less than 5 per cent of this type is now cultivated, and much of this consists of marginal areas and slightly elevated ridges where the natural drainage is better than on the lower ground. Corn, cotton, sugar cane, sweet potatoes, and various minor crops are satisfactorily grown. The sugar cane grown on this land produces a fine-flavored sirup. Strawberries are grown on a commercial scale on this type in other areas.

Owing to its level surface and ease of tillage, much of this type eventually will be brought into cultivation. Drainage by open ditches will probably prove efficient, but it is also possible that tile drains could be installed with profit in many places. The ridge method of tillage, or some modification of it, is necessary to facilitate surface drainage. Since contour cultivation is not required, farm machinery may be used to better advantage than on rolling lands. The lack of organic matter must be supplied by growing legumes, and the high degree of acidity which most of the type shows would require rather liberal applications of lime for its correction.

MYATT VERY FINE SANDY LOAM

The Myatt very fine sandy loam is a gray very fine sandy loam underlain at about 1 to 4 inches by light-gray very fine sandy loam, faintly mottled with pale yellow, grading at a depth of about 10 inches into more intensely mottled very fine sandy loam, with a somewhat compact or stiff fine sandy clay loam at depths of 20 to 40 inches. This lower section is rather impervious and often comparatively dry, while the material just above it, the middle subsoil, is

saturated. In some areas the soil is a rather dark gray very fine sandy loam, becoming light gray with depth, underlain at 14 to 18 inches by bluish-gray or light-gray very fine sandy clay loam mottled pale yellow, passing at 15 to 26 inches into mottled pale-yellow and bluish-gray fine sandy clay and at 30 to 40 inches into mottled pale-yellow and bluish-gray plastic clay.

Small concretions the size of shot or peas are usually present in the subsurface and middle subsoil in moderate quantities. Yellowish stains along the line of grass roots suggest incipient bog-iron development. The soil material above 20 to 30 inches lacks the tendency to form small aggregates or soil granules common to some silty very fine sandy loams having normal moisture conditions and containing some humus. The subsoil in places shows but little yellow mottling. Apparently the organic content is low, except in the immediate surface soil, which in some places is dark gray in color. Included low areas along the margins of the terraces consist of Myatt fine sandy loam.

The Myatt very fine sandy loam has a flat surface and occupies slightly depressed areas on the terraces of Pascagoula River and Black Creek. It includes much of the crawfish land and meadow of the Pascagoula pine flats. During the winter season, and for considerable periods after heavy summer rains, the surface soil is saturated, since little water escapes except by evaporation. During a dry summer the surface becomes hard and decidedly light colored.

A scattered stand of small pines and cypress constitutes most of the tree growth. There are few bushes. Even the gallberry does not grow as well as on the darker colored Okenee types. Broom sedge, wire grass, and some coarse rushlike grasses generally are shorter and more bunchy than on the adjoining Kalmia soils. Pitcher plants and "button tops" are commonly abundant.

This type is not in cultivation and has little present value except for pasture. Its utilization for cultivated crops would require much outlay for drainage and fertilization. Slash pine probably could be grown.

Included with the Myatt very fine sandy loam are some areas of the Myatt sandy loam, which is not of sufficient extent in this county to warrant separate mapping. It includes low marginal areas of the second bottoms in which variable soil conditions occur, but the predominant type is a very shallow dark-colored sandy loam underlain by light-gray or mottled gray and yellow sandy loam or sandy clay. As a rule the surface soil contains enough organic matter to give it a dark-gray, or in low spots, a black color. Many of the low spots merge into Ochlockonee clay, formed by sedimentation from backwater, but these areas are so small or have such indefinite boundaries that separation is impracticable. The slightly sloping areas and parts which lie above the ordinary floods generally have the characteristic Myatt features, a shallow surface soil over a light-colored or mottled subsoil, indicative of almost chronic saturation. These areas are densely wooded and of inferior value for pasturage.

LEAF SILT LOAM

The surface soil of the Leaf silt loam is a dark-gray to yellowish-brown silt loam, in some places black, passing rather abruptly at

1 to 4 inches into light-gray, pale-yellow, or yellowish-gray silt loam, and at 6 to 15 inches into pale-yellow or mottled pale-yellow and gray silty clay, which in turn passes at variable depths into plastic clay, mottled pale yellow, red, and bluish gray. The mottled stiff clay resembles the subsoil of the Susquehanna, but usually contains more fine sand. In places there is very little red mottling, the lower subsoil being mottled yellow or pale yellow and bluish gray.

This type occurs on terraces of all the larger streams, generally associated with the Myatt and Okenee soils. Its most distinguishing feature is the heavy mottled clay lower subsoil, but as this occurs at variable depths the individual areas of the Leaf silt loam are not very clearly defined in some places, and variations of the type toward Myatt and Okenee soils are numerous. The influence of local topography and depth to clay is very apparent in surface conditions and in distribution of vegetation. As a rule on the typical Leaf silt loam of this region, that is, where the heavy clay is within 15 to 20 inches of the surface, grasses and small flowering plants constitute most of the vegetation. Trees and bushes are not numerous, and even the gallberry is usually absent. In depressions tending to be permanently wet, with greater accumulation of organic matter in the soil and greater depth to mottled clay, the soil resembles the Okenee silt loam and the vegetation includes slash pine, bay, soft maple, titi, holly, and many other bushes and vines. Local elevations usually have some pine and scrub oak.

Most of the areas on Escatawpa River above Latonia are open grass lands, subject to occasional overflow. They afford better pasturage than the more sandy soils. The areas on the Pascagoula River near Basin have a little better surface drainage than much of the type elsewhere. The soil here contains more very fine sand and the stiff clay is usually encountered at greater depths. The areas below Avent are associated with the Myatt very fine sandy loam, and sharp lines of separation are not easily fixed. The higher ground—usually low, miniature ridges a few feet higher than the adjacent flats—and the short slopes near drainage lines are sufficiently well drained for cultivation. Most of the other soil would need ditching. Sugar cane, sorgo (saccharine sorghum), lespedeza, and grasses could be grown with reasonable assurance of fair yields except in very wet seasons. Most of the type is poorly adapted to corn, cotton, oats, and most vegetables unless drained. It is suitable for wild grasses, and these seem to be less bunchy than on the sandy soils, while carpet grass and lespedeza form deep sod around old house sites and roads. Ditched land probably could be successfully used for a mixture of white and alsike clover with herd's-grass, after an application of about 1 ton of crushed limestone per acre.

Those parts of this type having the mottled tenacious clay within 20 or 30 inches of the surface are essentially useless for cultivated crops until an adequate system of ditches is installed. Some of the lighter textured variations, which have a yellow rather friable subsoil extending to depths of about 30 inches, are usable, but these areas are generally very small. On all phases, except local depressions where water stands most of the year, pines grow well after attaining sufficient size to endure the grass fires.

OKENEE SILT LOAM

The Okenee silt loam is a black silt loam grading at 5 to 10 inches into dingy-brown or grayish-brown silty clay loam which passes into plastic silty clay mottled yellow and gray or yellow and bluish gray. In places there is some red or reddish-yellow mottling in the clay layer. Locally the soil ranges to very dark brown and the subsoil shows more yellow than is typical.

This type is developed on the wet parts of terraces of the larger streams. The surface is flat to slightly depressed and the drainage is very slow. Shallow water stands in local depressions during the winter and for some time after summer rains. This rather frequent saturation doubtless accounts for the large accumulation of black organic matter in the soil. The subsoil does not differ much in its physical properties from that of the Kalmia and Myatt soils and is doubtless of similar mineralogical composition.

The Okenee silt loam supports a comparatively heavy growth of native grasses in which round-stemmed rushlike ferns are abundant, with some broad-leaf species common to the wettest soils. Broom sedge, wire grass, and paspalum are the principal grasses on the less swampy variations. Gallberry and small huckleberry are common shrubs. There is some bay, titi, soft maple, and slash pine in the lowest spots, and a rather thin, uneven growth of pine elsewhere.

None of this type is cultivated. While much of it could be improved by drainage, it might not be profitable under present conditions to attempt expensive drainage operations. Adequate outlets with numerous laterals would be necessary on account of the depressed surface and the compact subsoil. Lespedeza and carpet grass should do well on this land with less complete drainage than is necessary for cultivated crops.

Areas of Okenee sandy loam occur on second bottoms of the larger streams. Owing to their small extent and low agricultural value they are included in the Okenee silt loam. The typical soil, which is confined to the lowest parts of local depressions, is a black sandy loam 10 or 12 inches deep underlain by dark-gray or ashy-gray sandy loam which grades into sandy clay at 20 to 25 inches. It is covered with water for long periods after rains, and as a rule is soft and boggy during most of the winter. Spots of this type are numerous in the Kalmia and Myatt soils and as a rule support a more varied growth of trees and bushes than the surrounding soils. Some of these spots are essentially swamp. The type can not be used for crops without artificial drainage, but some areas could be drained at reasonable cost.

Okenee silt loam, swamp phase.—The swamp phase of the Okenee silt loam as mapped includes those permanently wet depressed areas locally known as bays. All are densely forested, bay, magnolia, swamp maple, and slash pine being the dominant trees, with a great variety of smaller growth in which titi, star anise, bush huckleberry, smilax, and jasmine are most common.

The soil is variable, ranging from a shallow black muck over light-grayish silty clay to deep, saturated muck. In the great area lying south of Mountain the soil in many places is a deep, black

silty clay over lighter colored material of similar texture. This area is subject to inundations, chiefly backwater from the Pascagoula River floods. It contains some "islands," of which the higher parts are mainly Kalmia fine sandy loam, and the margins are more like Okenee or Myatt soils. In this bay there remains much slash pine of fine quality.

The large area on the west side of Escatawpa River and about 2 miles south of Howell Bridge is a backwater bay, heavily forested, in which the soil is of comparatively recent sedimentary origin. Juniper Bay, on the opposite side of the river, is a more typical Okenee silt loam area, with open areas of Myatt and Leaf silt loams bordering it on the river side.

Many small areas of swamp, or bays, are found on all the second bottoms of the larger streams. In many places the compact subsoil resembles that of the Leaf silt loam and apparently is responsible for the saturation of the overlying material. This is especially true of the area near Merrill and some small areas in the vicinity of Cross Roads.

The swamp phase seems especially adapted to slash pine, and the larger and less easily accessible areas still contain much timber of this kind. There are some large oak and sweetgum trees, but these prefer the Ochlockonee soils and are never so abundant in the bays as in the first-bottom swamps.

Expensive ditching would be necessary to reclaim these areas. With drainage they probably could be used to best advantage for corn, grass, and lespedeza.

OCHLOCKONEE FINE SANDY LOAM

The Ochlockonee fine sandy loam includes all the sandy soils of the first bottoms along the Pascagoula River, but only the larger areas of these have been shown on the map. These mapped areas are narrow strips, varying in texture from silty fine sandy loam to coarse sandy loam, and seldom extending more than a few hundred feet back from the bank. Much of the soil consists of brown to light-brown fine sandy loam, grading through light-brown or yellowish-brown fine sandy loam into yellow or brownish-yellow friable fine sandy clay loam to silty clay. The surface is slightly hummocky or billowy. "Cuban" pine, sweetgum, ironwood, magnolia, and yellow jasmine are the principal plants.

The areas near Wilkerson Ferry lie somewhat higher than the average marginal strip of sandy soil, and range in surface texture from coarse loamy sand to fine sand containing considerable silt. There is usually little difference in texture between the surface and subsoil material. A few of these areas were formerly cultivated and excellent yields of corn, sweet potatoes, and pumpkins were easily grown. Nearly all have been abandoned on account of the more rapid and frequent rise of flood waters than in former years. Lespedeza, hop clover, and carpet grass thrive on the higher ground, along with broom sedge and weeds. The encroachment of sweetgum bushes and old-field pine tends to crowd out the grassy growth, and most of the old fields have reverted to forest.

OCHLOCKONEE SILTY CLAY LOAM

The first bottoms of Escatawpa River and Black Creek are densely wooded and subject to frequent overflows. The deep and crooked channels of these streams are bordered by sandy alluvium, which in most places extends only a few hundred feet from the channel or across the narrow strips of land in the sharper bends. Back from the sandy soil occurs the Ochlockonee silty clay loam, consisting of brown silt loam to silty clay loam, underlain by light-brown or yellowish-brown silty loam or silty clay of rather loose structure to stiff bluish-gray clay. Where the surface layer is a silt loam it is usually quite shallow. The variations are determined by local surface configurations, depth to underlying sand, and vagaries of deposition by the flood waters. There are many remnants of former channels, narrow lakes, sloughs holding muddy water, and occasional small sandy spots. The occasional high banks in which yellow sandy clay is exposed are in most cases low terraces of Kalmia fine sand, against which the stream is undercutting.

Since both of the streams mentioned originate in the Coastal Plain region, they receive little material from soils of calcareous nature. The highly siliceous sands and the heavy clays of coastal regions have contributed most of the sediment. In this respect, as well as their coarser texture, these soils differ from those of the Pascagoula flood plains. This is also true of the Whisky Creek swamp, in which silty or very fine sandy soils occur.

Owing to the thick forest, the pasturage value of these areas is not very high, although they afford some winter grazing, and hogs feed on the mast. If cleared, good lespedeza and Bermuda-grass pastures could probably be established. Safe cultivation would require expensive canalling and ditching and possibly leveling. With effective drainage it would be a good soil for corn, grass, and forage crops, but under present economic conditions forestry probably is the best use for the type, along with such grazing as it affords.

OCHLOCKONEE CLAY

The Ochlockonee clay generally consists of brown silty clay, grading at about 5 to 8 inches into yellowish-brown or yellow silty clay, which passes below into mottled bluish-gray and yellow or pale-yellow silty clay. In places a little reddish mottling is noticed in the lower subsoil. The subsoil crumbles on drying, somewhat like the buckshot clay of the Mississippi bottoms, though it contains very little, if any, lime carbonate. This clay is not impervious, but offers considerable resistance to downward movement of water, particularly where it is deepest. Exposures along the river reveal a sandy layer in the substratum.

Since the principal upper tributaries of the Pascagoula River cross the Vicksburg limestone and associated rocks, material from these series doubtless constitutes a considerable part of this clay, forming a richer mineralogical complex than the alluvial deposits of strictly local origin.

The organic matter present is brown rather than black and is intimately mixed with the mineral constituents. As a rule it does

not appreciably affect the color below 6 or 8 inches, although its influence upon the structure of this heavy material may extend considerably deeper. Black mucky material is confined to occasional low spots where shallow water stands most of the year.

The Ochlockonee clay is the dominant type in the bottoms of the Pascagoula River. As mapped it includes some variations. One variation consists of narrow strips of brown fine sandy or silty loam bordering the present channel. These low ridges, seldom rising more than a few feet above the general level, usually have a surface soil of somewhat deeper brown color, apparently due to the presence of fine sandy material within or just below the 3-foot soil section. These "sandy hammocks" as the land is locally called, are of very rare occurrence back from the streams. There are a few flat areas, mostly of small extent, on which the drainage is so slow as to give rise to the Bibb soils in which the grayish mottled coloration begins at a depth of a few inches. Most of the surface is somewhat uneven owing to innumerable abandoned channels and their natural levees in all stages of obliteration. To the muddy flood waters, which overspread the entire type several times each year and the occurrence of a permeable substratum, may be attributed the comparatively uniform character of the soils throughout this great area.

All this great alluvial tract is densely forested. Much of the present growth consists of rather young trees following the mature ones of great size and fine quality that have so generally been removed by lumbermen or destroyed by storms. Much valuable timber remains, consisting largely of sweetgum, white, red, and water oak, magnolia, soft maple, some hickory, ash, poplar, and swamp pine, and an abundance of holly, ironwood, other small trees, bushes, and vines. Cypress and tupelo gum are common on the half-filled channels and on the margins of lakes. Owing to the dense shade there is little grassy growth and the once abundant wild cane is rapidly disappearing.

The utilization of these rich soils for cultivated crops seems a remote possibility, as the area is not considered of sufficient extent to justify reclamation by means of levees. Practically all is inundated one or more times each winter or spring, and summer floods sometimes occur. If cleared, lespedeza, Bermuda grass, and other grasses could be grown for pasturage and possibly even for hay, but until there is a greater scarcity of land it seems best to utilize these bottoms for timber and whatever grazing they will naturally supply for cattle and hogs.

BIBB VERY FINE SANDY LOAM

The Bibb very fine sandy loam is a gray very fine sandy loam, usually faintly mottled with rusty brown, yellowish brown or dark bluish gray, and underlain at 2 or 3 inches by light-gray very fine sandy loam, in places faintly mottled with pale yellow, passing at depths ranging from 12 to 20 inches into silty fine sandy clay or fine sandy clay loam of mottled light gray or light bluish gray and pale yellow. When dry the soil has a mouse-gray color and becomes very friable. When moist it is clammy and is lacking in

the crumb or grain structure of darker colored soils of similar texture.

This type occurs mainly in the flood plains of Red Creek from the line between Ranges 8 and 9 to the south boundary of the county. Above this line the flood plain is not so wide, and while the soil in most places consists of Bibb very fine sandy loam, there are many spots of higher lying ground on which brown or brownish-gray surface soils are underlain by a yellow sandy clay subsoil. The banks of the creek in many places are occupied by brown sandy soils, although usually these do not extend more than a few rods back from the channel. These brownish variations are more fertile than the gray soil. All of the type is subject to frequent overflow, and practically all of it is densely forested.

Soils like the Bibb very fine sandy loam, when protected from prolonged overflows, are well adapted to lespedeza, Bermuda, and other grasses of higher pasturage value than those commonly found on the upland types. Under tillage, corn, cane, and many forage crops do well, but careful management is necessary, for such soils do not endure extremely wet or prolonged dry weather.

SWAMP

The areas mapped as Swamp along the larger streams are lowlands in which such a variety of soils occur that a separation into types is impracticable. They range from sandy materials deposited by the latest overflows to low islands or peninsulas of Kalmia soils. Many of these areas consist of dark-colored soils resembling the heavier Ochlockonee types, but there is not so much Muck as in "bays" and along the small streams. Swamp is subject to very frequent overflows, and transient ponds as well as temporary channels are numerous.

All these areas are densely wooded, with occasional openings on the higher banks, which afford camp sites for fishermen and hunters, and loading places for the logs that are floated down the streams.

MUCK

Some small areas of true Muck occur at the heads of drainage lines on the uplands near Mauvella. With respect to topographic position and surface appearance, these areas resemble the Plummer fine sand, but the more permanently wet condition has favored growth of sphagnum moss and other moisture-loving plants, and caused less rapid decomposition of their remains than occurs in the typical Plummer areas. Black spongy Muck or carbonaceous material several feet deep occupies the entire basin of some of the depressions and the center of others.

Some pasturage is offered by the moss, coarse grasses, and various flowering plants. The only trees are bay, cypress, and tupelo gum, which occur scatteringly. These Muck areas can not be utilized for the truck crops to which they are otherwise adapted, except as the moisture content is under control. This requires effective drainage, and in these small areas this seems impracticable, although a small acreage might be made productive by deflecting the seepage from the adjacent higher land.

Along nearly all the small drainage ways there are strips of swamp ranging from 100 to several hundred feet wide, in which the soil is a black, saturated Muck, 3 feet or more in depth. At the margins and along the stream channels in the wider areas black silty or sandy soil with light-colored subsoil may occur, but the dominant material is soft Muck in which the roots of trees and shrubs form benches or low hummocks. The shallow channels in places split into several branches or are lost between the "tussocks," but most of them maintain their flow throughout the summer. These Muck accumulations in the western part of the county appear to be deeper and include less soil like the Okenee silt loam than those east of the Pascagoula River. The Muck as a rule is best developed along courses of the streams draining large areas of sandy uplands with heavier types on the lower hillsides.

Near Mauvella the heads of several small branches tributary to the Escatawpa River expand in rather flat areas of deep, peaty Muck covered with grasses, flowering plants, and sphagnum moss. Occasionally patches of a few acres of similar open Muck are found along the middle course of the Cedar Creeks. Some hillside spots of open Muck are associated with the Plummer fine sand on lower Brushy Creek.

With the exceptions noted above, practically all the Muck is densely forested. Bay is the dominant tree, with more or less oak and maple and some tupelo gum, magnolia, and poplar. The slash pines flourish, and wherever spared by the lumberman, their tall trunks rise high above all the other vegetation. The undergrowth includes much star anise, titi, fetterbush, and, on the outer margins, huckleberry, gallberry, and blackberry bushes. Jasmine, smilax, and other vines are abundant. There is very little wild cane or grass. As mapped these areas include many seepy spots on adjoining slopes. The grassy growth on these spots and the shrubby growth in the swamp afford some pasturage, but in general their value for this purpose is low. In some places a limited acreage might be cleared and drained without great expense, so that carpet grass and lespedeza could establish themselves. A few areas could be reclaimed so that cabbage, celery, onions, and other crops, adapted to Muck, could be safely raised. Taken as a whole the Muck areas are more suitable for forestry than for any other purpose.

SUMMARY

George County is located in the southeast corner of Mississippi. It has an area of 475 square miles. Most of the region consists of rolling uplands, formerly covered with longleaf pine but now comparatively open cut-over lands. The level tablelike divides are largely in cultivation, as well as the better drained types of the wide second bottoms of the larger streams. About one-fourth of the total area is included in farms, as reported by the 1920 census, and about 15,000 acres are used for crops.

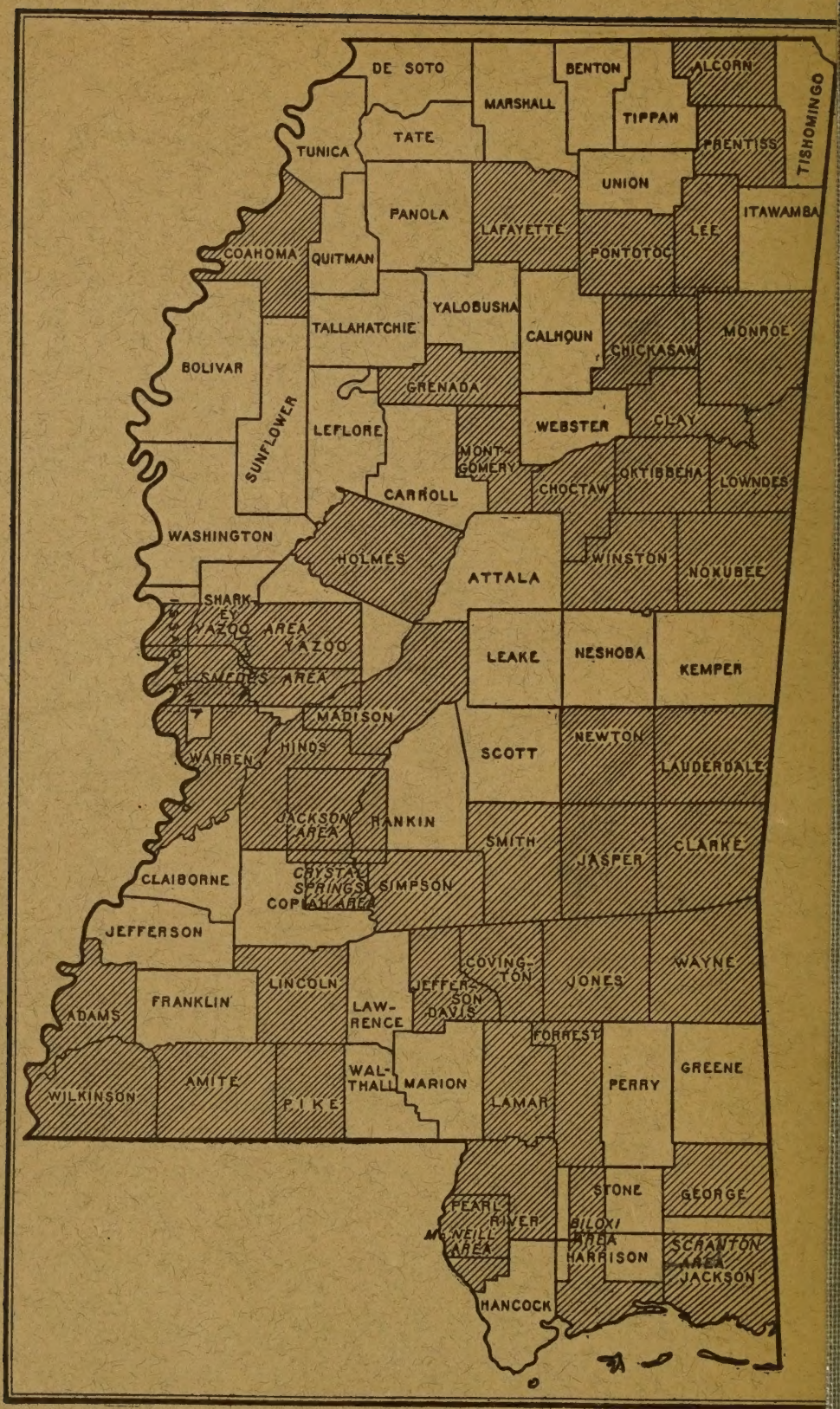
The mild climate favors the production of a very wide range of cultivated plants. The crops regularly grown on the great majority of farms are corn, oats, sweet potatoes, sugar cane, velvet beans, and cotton. Near Lucedale considerable trucking is done. Potatoes and sweet potatoes are the principal shipping products, with peas, beans,

and melons as minor crops. The Satsuma orange and the pecan have been grown successfully for some years, and are assuming commercial importance.

The great areas of unfenced land afford free pasturage for all livestock, much fuel wood, and considerable wood for other purposes. Cattle are an important source of income for most farmers and sheep are successfully raised to a small extent. Most of the meat requirement of the county is economically met by the production of pork.

The soils of greatest agricultural importance are the "red lands," which include several types of the Greenville, Orangeburg, and Ruston series. These are well-known soils of the Coastal Plains region of the Southern States. In this county the Greenville soils are less extensive than the Ruston and Orangeburg.

The first bottoms are occupied chiefly by Ochlockonee soils, which are very fertile but are mostly untilled on account of overflows. The second bottoms include some tillable areas of the Cahaba (red) and Kalmia (yellow) soils, but also embrace wide areas of less well drained types of the Myatt, Okenee, and Leaf series.

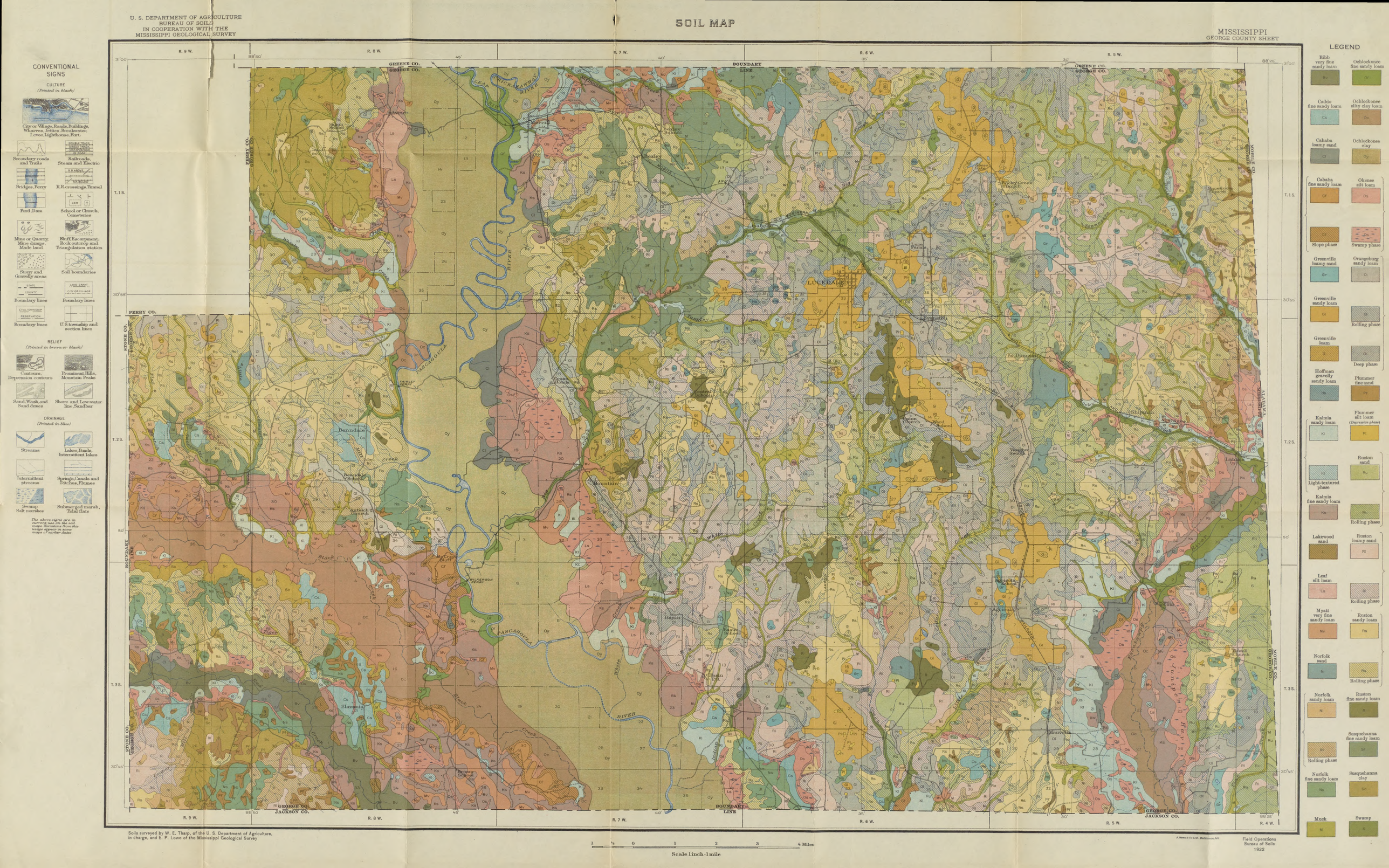


Areas surveyed in Mississippi shown by shading

U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF SOILS
IN COOPERATION WITH THE
MISSISSIPPI GEOLOGICAL SURVEY

SOIL MAP

MISSISSIPPI
GEORGE COUNTY SHEET



Soils surveyed by W. E. Tharp, of the U. S. Department of Agriculture, in charge, and E. P. Lowe of the Mississippi Geological Survey

1 ½ 0 1 2 3 4 Miles
Scale 1 inch-1 mile

A. Hoen & Co. Lith. Baltimore, Md.

Field Operations
Bureau of Soils
1922